ANNALS

OF

SURGERY

A MONTHLY REVIEW OF SURGICAL SCIENCE AND PRACTICE

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VOLUME LXII

JULY—DECEMBER, 1915

PHILADELPHIA

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1915

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ANNALS *of* SURGERY

VOL. LXII JULY, 1915 No. 1

NOTES ON MILITARY SURGERY

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OF CLEVELAND, OHIO

(From the service of Lakeside Unit, American Ambulance, Neuilly-sur-Seine, Paris, France)

AT the outbreak of the war a group of Americans in Paris, aided and encouraged by our able American Ambassador, mobilized the resources at hand and with surpassing dispatch organized a most efficient hospital of 450 beds. In general it may be said that probably never before in the history of hospitals has one been governed by an organization of such talent and such deep consecration as is found in this group of business, professional, literary, artistic, diplomatic men and women. I cannot sufficiently express my admiration for the achievement of this group of individuals in so efficiently expressing their sympathy for the injured soldier. The hospital was organized under the charter of the established American Hospital of Paris, and is known as the " Section for the Wounded." The hospital is located in Neuilly, a suburb of Paris, in a beautiful new building intended for a high school. The organization is efficient, the management excellent, the cuisine under Frascatti, and the personnel talented and cosmopolitan.

The American Ambulance is under the direct control of the War Department, of which Dr. Winchester Du Bouchet, the Surgeon-in-Chief, is the direct representative. There are four services, three of one hundred beds each, under Dr. Du Bouchet, Dr. Joseph A. Blake and Dr. Mignot, and the University Service of one hundred and fifty beds. In the course of discussions of the problems of the American Ambulance it was suggested that it would be to the mutual advantage of American surgery and of the American Ambulance, if certain of the teaching Universities were to form units to take charge of one division of the American Ambulance for a period of three months each. To a letter from Dr. Joseph A. Blake favorable response was made by Harvard University, the University of Pennsylvania, Chicago University, Western Re-

serve University, and other universities are giving it consideration. It was the desire that each university should finance its unit, and that each unit should consist of a sufficient number of surgeons and nurses to carry on the work of the operating room, and the surgical care of the patients in the wards. The nursing care of the wards was assumed by the American Ambulance. The Medical Board, according to Dr. Blake's letter, felt that in this way a considerable group of American surgeons would become familiar with military surgery, and in turn would disseminate their knowledge so that a more intelligent conception of this branch of surgery would in some measure prepare us for possible need in our own country. It was not intended that the universities should assume any unneutral position, any more than surgery or science is unneutral. It was believed also that by this means the interest of the participating universities would be kept more closely in touch with the relief problems of the war. Furthermore, it was hoped that this action on the part of the universities would stimulate in the cities in which they are located a personal interest in the American Ambulance.

The Medical Board of the American Ambulance set apart the entire third floor of the hospital for the University Unit. This comprised nineteen wards of eight beds each, and two large, well-lighted rooms for an operating room and research laboratory. These two rooms were originally designed for draughting rooms and so had a northern exposure and were provided with skylights. It will be seen therefore that the management and the Medical Board of the American Ambulance were exceedingly generous in putting at the disposal of the American University so large, commodious and well-equipped a service.

I must add here that from the beginning to the end of the service of the Lakeside Unit of Western Reserve University the greatest courtesy and helpfulness were manifested by the management, by the Ambulance and by its Medical Board.

Under the management of Dr. Gros the Ambulance Department itself has rendered extremely efficient service. The ambulances of the American Hospital operated all along the line up through northern France into Belgium—wherever their services were most required. At the conclusion of my service I had the opportunity of paying a visit to the principal ambulance stations in France and Belgium. Everywhere I found that the ambulances were kept in splendid condition, and were operated most efficiently, the drivers being for the most part Americans—college men, polo players, hunters, and soldiers of fortune. Thus far there have been no fatalities among the ambulance men,

although there have been several narrow escapes, especially during the recent aërial bombardment of the railway station at Dunkerque when some damage was done to several of the ambulances, but the men were uninjured.

Nursing.—The professional nurses of the American Ambulance were efficient and their personnel was most cosmopolitan. Sixty-three hospitals and thirteen nationalities have had representatives in the nursing corps. The heads of the wards and departments were professional nurses; these were assisted by volunteer auxiliary nurses, among whom were artists, authors, actresses and social leaders. Those auxiliary nurses who had been on duty since the ambulance opened had obtained a high degree of efficiency. They were punctual, obedient and devoted to their work, and many of them have become extremely proficient.

Orderlies.—The orderlies were volunteers also. Aiding them there were students, artists, authors, singers and noblemen. In one of our wards an orderly—a count—routinely had mounted in gold the bullets and shrapnel surgically removed from the soldiers. The personnel of this hospital is practically the same as in the hospitals of all of the warring nations, but it so happens that in the American Ambulance there is an unusual concentration of talent in all its departments. It certainly was not without surprise that one found among the orderlies in a ward men who had made great names as painters, sculptors, authors, or who held high positions in financial and political life.

Management.—In its efficiency the management could bear comparison with the best institutions anywhere. The cost of maintenance is lower than that in a hospital of equal efficiency under normal conditions.

The Lakeside Unit.—The Lakeside Unit consisted of a chief and four members of the graded surgical staff of the Lakeside Hospital who were residents in the American Ambulance under the same conditions and the same organization as when on duty in the Lakeside Hospital, a neurologist, an internist, two anæsthetists, two operating room nurses, and two research workers.

The first feature of the service to impress one coming from civil practice was that only able-bodied young men were seen as patients. We had in our wards not only French soldiers, but Turcos also, and some English. The soldiers exhibited a splendid moralé, rarely complained no matter how severe their lesions; they showed marked resistance to infection and exhibited a high power of repair. I was quite unprepared to find the French soldier so stolid.

Immediately after arrival the University Unit received from ten to thirty-nine patients every day, until the service of one hundred and fifty beds was filled. For the most part the patients were admitted at night. Normally from five to ten operations a day were performed. As compared with the work in civil practice, these operations were far simpler in technic, the outstanding difficulty, as pointed out by Dr. Blake, being judgment regarding the proper procedure in the more severe infections. I believe I have never known more difficult problems in infection than those presented in this service.

Anæsthetics.—Many operations being relatively short and performed upon very sick patients—exhausted, exsanguinated, extremely septic—nitrous oxide-oxygen proved to be the ideal anæsthetic. We took with us a supply of this anæsthetic and two anæsthetists skilled in its use and administration. Its great advantages were at once so apparent that our anæsthetists and supply of gas were utilized by the other services, especially in critical cases. Our anæsthetists found that the French soldier presented a different problem than the average civilian patient in this country, in this respect, that while the stage of induction was longer and more difficult, after the induction was completed, they required a relatively smaller amount of the anæsthetic and it was easier to maintain a smooth and even anæsthesia. A similar difficult induction in our patients at home would indicate a certain amount of alcoholism. It is probable that the more common use of alcohol among the Europeans would account for the generally greater difficulty in anæsthetizing patients. This difficulty is notably manifested in the use of ether. The French patients responded quickly at the close of the operation and many of them were able to walk back immediately to their wards. During anæsthesia, especially during its induction, the patients would frequently experience exciting dreams of battle.

The most interesting operation performed during our service was performed by my associate, Dr. Wm. E. Lower, who successfully removed a bullet from the pericardium.

Infections.—The greatest outstanding problem in the surgery in a base hospital is that of infections. Almost every wound was infected. Despite the perfection in technic in aseptic surgery in civil practice, in military surgery asepsis has failed. Antiseptics have failed. The type of infection depends in a measure on the type of injury, on the state of the soldier, and on the length of interval before the wound receives adequate treatment (Fig. 1).

Much of the soil of France and Belgium for generations has been under a high degree of cultivation involving the use of much manure,

which is laden with gasogenic bacteria, such as tetanus and the Welch bacilli, which cause gas gangrene.

As the military operations of the present war are carried on almost wholly in trenches the clothing and skin of the soldier become laden with these germs, which the ball or shrapnel carries into the tissue. The type of wound has an important bearing upon the question of infections. Rifle balls usually make clean-cut wounds, only occasionally carrying clothing into them. Shrapnel and shell very commonly carry clothing into the wound—the highly infective clothing being a dangerous factor. In addition, the injuries from shell or shrapnel differ locally from a rifle injury in the following respect: The former produces a larger zone of contused and particularly devitalized tissue, which has a low resistance to infection. Most cases of gas gangrene follow shrapnel and shell wounds. Hence surgeons are now promptly treating these wounds by clearing out foreign bodies, excising the devitalizing tissue, and providing good drainage.

As to the treatment of wounds when once infected, I gathered from the leading surgeons in the British and the French armies that there has been no material progress made since the Franco-Prussian war. It has been said that the discovery of an efficient antiseptic would be worth 20,000 soldiers to the French army. As I have stated already, asepsis has failed; antiseptics have failed. Therefore, as pointed out by Sir Berkeley Moynihan, along this line the surgeon must begin his work afresh. Sir Almroth Wright and his staff at Boulogne are engaged in important researches, and progress is being made by them in combating infections, and doubtless there are extensive researches in progress elsewhere.

Under the auspices of the Rockefeller Institute, Alexis Carrel has gathered together a strong research group, including Dr. Dakin, who are to conduct a research into infections in a hospital near the line at Compiègne. This move is strongly seconded by Professor Tuffier. It is the belief that some new means of chemically controlling infection must be found. Sir Almroth Wright and Sir Berkeley Moynihan have pointed out the shortcomings of dry dressings which, by holding the products of infection close upon the wound, form a pus poultice. This pus poultice not only interferes with wound healing, but causes the absorption of poisonous enzymes. These observers advise warm moist dressings, immersion in hypertonic solutions of potassium citrate and sodium chloride, and, in severe knee or thigh injuries, the immersion of the patient in a bath. In our University division at the American Ambulance we tried the open-air treatment, after a certain

stage was reached, and apparently secured better results than with dressings. The exposure of wounds to the electric light is especially advocated by Dr. Du Bouchet. Hot packs, immersions in hot water, free incisions, good drainage, physiologic rest, seem up to this time to constitute the best treatment.

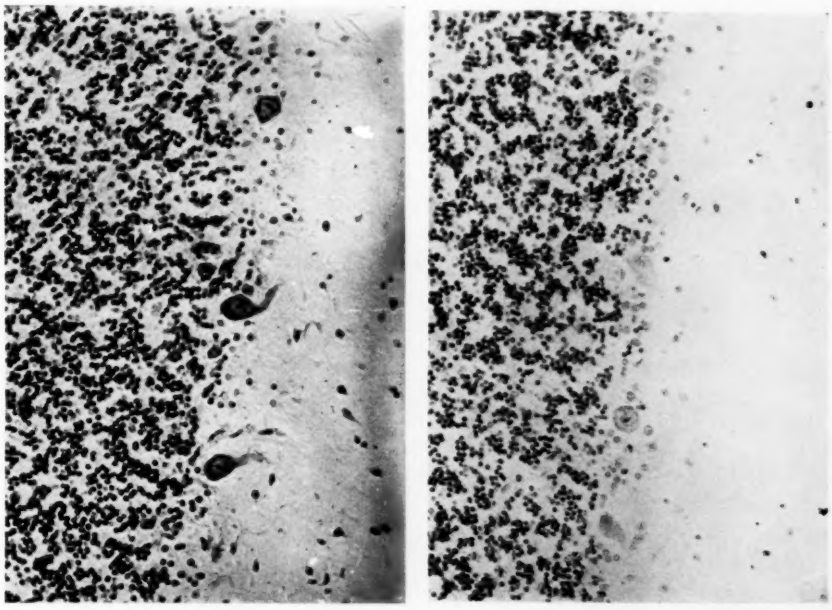
Gas Gangrene.—Gas gangrene has been studied by Professor Weinberg, of the Pasteur Institute, and Dr. Jablons, Pathologist of the American Ambulance. Beyond a note by Weinberg these researches have not been published. One point seems quite clear, that is, that in many wounds many tetanus and gas bacilli may be found and yet neither tetanus nor gas gangrene may develop.

The clinical phenomena—*viz.,* fever, rapid pulse, increased respiration, sweating, delirium, unconsciousness and death—and certain researches in my laboratory in association with Dr. Austin and Dr. Hitchings on the effect on the kinetic system of toxins and infections lead me to the opinion that death from gas gangrene is caused by structural injury of the brain, the adrenals and the liver. The odor of these cases is apparently that of indol and skatol, and in my laboratory we have shown that indol and skatol cause identical lesions of the brain, the adrenals, and the liver. No specific treatment has yet been found. Hope is entertained that a serum made at the Pasteur Institute by Professor Weinberg may be useful. Continuous oxygen infusions in the tissues beyond the advancing margins is favored by some. Prompt amputation, leaving the stump wide open and applying peroxide of hydrogen, apparently yields the best results.

Very free incisions and heavy cauterizations are advocated by others, but the mastery of this disease is for the future.

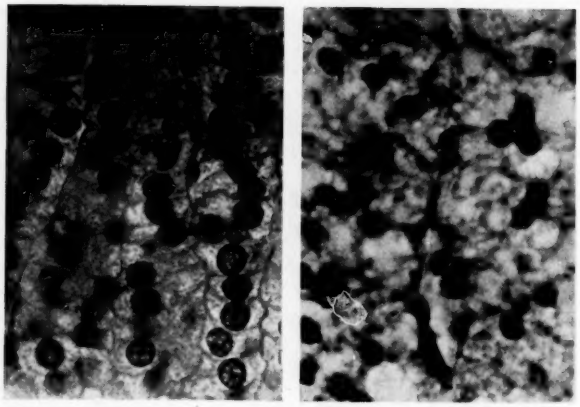
Shock and Exhaustion.—Next to infection shock and exhaustion have probably killed the greatest number of soldiers. The emotional factor in many instances is a serious menace; for example, in the case of men distressed by being cut off from the main body of troops and of wounded men lying in the zone of rifle fire in the area between the first line trenches of the opposing sides, where wounded men may lie under fire until night and sometimes at night even cannot be rescued. In the fully-manned first line trenches, which extend well across the continent, there are always intense emotional activations during both day and night. The emotional strain is especially great when the opposing trenches are separated by only fifty yards or less and each is filled with brave resourceful men with splendid equipment for killing. In the early part of the war when the law of the survival of the fittest was relentlessly applied, many men in all the armies fell

FIG. 1.—Case of perforating shrapnel wound of right forearm with fracture of both bones and infection. (Service of Lakeside Unit, American Ambulance, Neuilly-sur-Seine, Paris, France.)



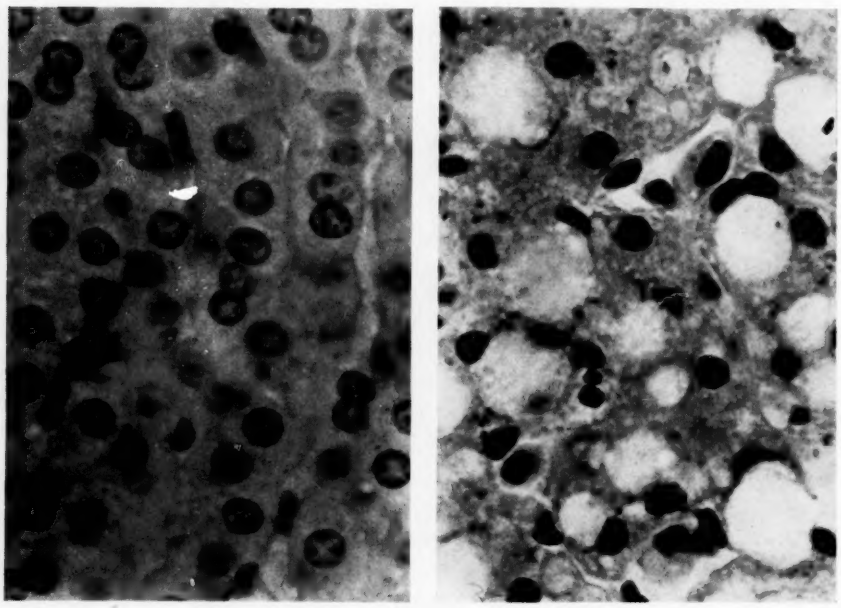
A *B*

FIG. 2.—*A*. Section of normal cerebellum. *B*. Section of cerebellum of soldier who was wounded while fighting in the trenches in France. His wound was not dressed until about four hours later and it was four days before he reached the American Ambulance, where he died after an operation for resection of the fractured head of femur. He was without food for nine hours. This shows the disintegration of the Purkinje cells caused by the combined effects of emotion, exhaustion, loss of sleep, pain, infection and surgical shock.



A *B*

FIG. 3.—*A*. Section of normal adrenal. *B*. Section of adrenal of soldier described in preceding figure. The general disintegration of the cells, loss of cytoplasm, misshapen and eccentric nuclei illustrate the effect of emotion, exhaustion, lack of sleep, pain, infection, and surgical trauma.



A *B*

FIG. 4.—*A*. Section of normal liver. *B*. Section of liver of soldier described in former figure. The general disintegration of the cells, the loss of cytoplasm, and the vacuolated spaces within the cells illustrate the effect of emotion, exhaustion, lack of sleep, pain, infection and surgical trauma.

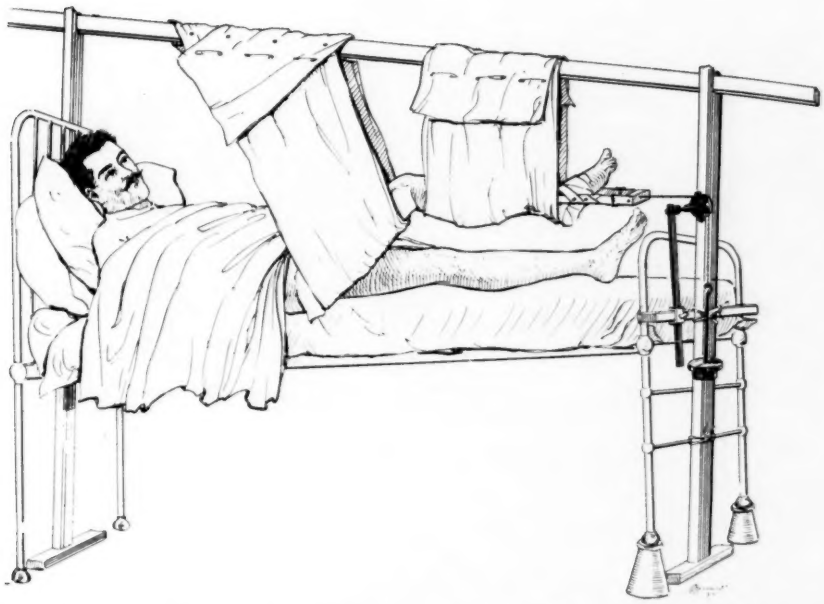


FIG. 5.—Balkan splint as used at the American Ambulance, Neuilly-sur-Seine, Paris, France.

FIG. 6.—Compound comminuted fracture of middle third of left humerus. Note the shattering and deletion of bone caused by a bursting shell. (Service of the Lakeside Unit, American Ambulance, Neuilly-sur-Seine, Paris, France.)

FIG. 7.—Lesion of external cutaneous nerve of thigh and of long saphenous nerve of leg, caused by rifle ball which entered just below right knee and emerged as shown. (Service of the Lakeside Unit, American Ambulance, Neuilly-sur-Seine, Paris, France.)

FIG. 8.—Frozen feet. (Service of the Lakeside Unit, American Ambulance, Neuilly-sur-Seine, Paris, France.)

under the emotional strain. By the process of elimination and hardening the emotional strain is diminishing. There have been numerous examples of complete breakdown without any injury. There are innumerable cases in which very slight injuries have caused great shock —even death. As for the treatment of shock, under the almost inconceivable difficulties encountered in the larger engagements, the best that can be done is to give morphia. When from three to five thousand wounded must be cared for by a few surgeons only, it is idle to think of any treatment—many of the wounded cannot secure a drink of water, even (Figs. 2, 3 and 4).

Hemorrhage.—Secondary hemorrhages may occur, for the relief of which successful transfusions of blood have been made.

Transplantation of Limbs: Blood-vessel Suture.—The exigencies everywhere existing, the difficulty in controlling an absolute aseptic technic, have prevented thus far successful transplantation of limbs. But it is hoped that later on conditions may be so controlled that the transplantation of limbs and blood-vessel suture may have a fair trial. The most important blood-vessel surgery will probably come after the war.

Head.—Head injuries do very well at first, but later certain secondary changes develop, such as abscesses, and epilepsy.

In the hands of American dentists—especially in the American Ambulance—wounds of the jaws and mouth have been treated with remarkable success. This wonderfully successful work in oral sepsis, in transplantation of teeth, in fashioning dental splints, in fabricating sustaining bridges, and in overcoming defects is one of the excellent products of the war.

Chest.—Penetrating rifle wounds of the chest do very well. There is usually a quick convalescence and an early return to the front. In some instances, however, a pleurisy develops after the wound seems to have healed. On the other hand, in the case of penetrating shell and shrapnel wounds empyema nearly always develops.

Abdomen.—Penetrating wounds of the abdomen have baffled the surgeon. Even in the most skilful hands immediate operation usually ends fatally, death being due to shock and infection. Occasional cases recover with or without operation. I expect later to hear a more favorable report regarding these cases from the Belgian Field Hospital, which is situated near the front.

Pelvis.—Wounds involving the bladder or ureters with shattering of the pelvic bones usually end fatally. The struggle is prolonged but futile.

Extremities.—High compound fractures of the thigh with great shattering of bone offer special difficulties; first the difficulty of transportation, then of shock and exhaustion, finally the inevitable infection. These cases call for the keenest judgment; for a decision to amputate depends upon the physical state of the patient, on the chances of transportation to a base hospital; on the length of time that will probably be spent in transit; on the probability of gas infection, on the equipment at the field hospital behind the line of battle, and on the ability and equipment of the surgeon in charge.

Shattering of the knee-joint presents a difficult problem, but these cases are more easily transported. Injuries of the leg and foot are easily supported for transportation. A shattered shoulder-joint, though far more amenable to treatment than the thigh, still presents much difficulty, especially when the infection spreads up over the shoulder to the neck, so that should gangrene occur the incision must pass through dangerously infected tissue.

The handling of vast numbers of compound fractures has brought out some new splints. Blake's splint is satisfactory, as it has the advantage of lightness, of simplicity, of giving excellent counter-pressure, of affording good room for dressings, and of admitting the free use of Buck's extension. Blake's splint also facilitates transportation and simplifies the taking of X-ray pictures.

Perhaps the most popular splint in the British service is the Balkan splint, one of the few useful products of the Balkan war. It is cheap, simple, can be made by anyone, can be used in many ways, and dispenses with coaptation splints and bandages. It consists of two wooden upright pieces at each end of the bed, the one at the head being higher; these two upright pieces support a ridge pole extending over the patient from the foot to the head of the bed. From this " ridge pole " the leg or arm is slung in slings, the extension apparatus being attached to the upright at the foot of the bed. By this means the limb is kept under extension and in an elevated position. This appliance gives the patient a large range of movement, gives the nurse good opportunity for work, permits dressings without movement, dispenses with splints or dressings, keeps off the weight of bed-coverings, and by the elevation of the limb swelling is minimized. We are introducing it into the wards of Lakeside Hospital (Fig. 5). Bone plating is used but little—but one surgeon is testing the value of the use of long Lane plates to facilitate transportation.

Repair of Infected Compound Comminuted Fractures.—After seeing the almost unfailing repair of widely shattered shafts of bone, the

wounds filled with shrapnel and clothing, neglected and exposed, one must renew his faith in the reparative power of nature. I have the conviction that with time and patience any bone will repair itself even if the destruction be extensive and infection be present. Dr. Du Bouchet, Dr. Blake, and Dr. Mignot showed me some wonderful cases of extensive bone repair (Fig. 6).

Aneurisms.—True aneurisms are in the process of formation and will not be in evidence until nearly a year has elapsed. There are many false aneurisms, however. Those have been most successfully handled. Simple ligation is usually sufficient. In the University service we ligated the brachial artery, but took the precaution to compress it for hours at a stretch at frequent intervals in order to force a collateral circulation in advance of ligation. Before dissecting out the false aneurism we also assured ourselves as to the competency of the collateral circulation by Matas's test. The result was excellent.

Peripheral Nerves.—In a base hospital one finds many lesions of the peripheral nerves and some lesions of the spinal cord and brain. A base hospital should therefore have the services of a neurologist. Dr. C. W. Stone, the neurologist of the Lakeside Unit of Western Reserve University, found much interesting material (Fig. 7). We soon found that total " physiologic " cross lesions by no means indicated anatomical cross lesions. In fact one was surprised again and again by the escape of nerve trunks—apparently they are pushed aside by the missile. In one instance I isolated the nerve and found it not divided, but much swollen, obviously having been much contused. I isolated a distance of about two inches, fashioned a fascia-fat flap from the adjacent tissues, wrapped the fat side of the flap around the bruised, swollen musculospiral as a protecting sheath, and held it in place by several stitches. There was early restoration of function.

Pseudo-Frost-bites.—A large number of cases of so-called frost-bite were seen, especially in the earlier months. The weather in northern France and Belgium is quite mild as compared with the temperature in this region of the United States and it was soon apparent that the so-called frost-bite was not due to the cold alone, but that it occurred as a result of the combination of three factors, moderate cold, dampness and tight-fitting shoes and leggings. It was stated that no one of these three factors alone would have caused frost-bite, but that this lesion was the result of standing in water for a long stretch of time, while shrinking shoes and leggings interfered with the circulation, together with the moderate cold.

We found the best treatment was to keep the feet cool and dry by

the application of stearate of zinc powder and exposure to the air. If gangrene had developed it was in most instances superficial. Though sloughing of the external parts was frequently observed, amputation was rarely necessary (Fig. 8).

Researches.—If this war has taught us anything it is that there is a most urgent need of research into the control of infections. As we cannot depend now upon Europe for this research, it becomes the clear duty and obligation of the profession in the United States to undertake it. It would be very desirable if the various civil laboratories and medical schools would take up this serious problem, especially with the point of view of discovering a chemical agent that will strike down infection after its initiation.

Conclusion.—In the early stages of the war when suddenly hundreds of thousands of wounded soldiers were flung hither and thither—and men untrained as surgeons had to acquire their experience at the expense of the soldier, the soldier not only had to pass through untrained hands, but these untrained hands had meagre facilities for their faltering work. This apparently is a part of the grist of the war mill. The army surgeon is relatively untrained in surgical practice, but he is highly trained in organization, transportation, emergency field work, all of which are of the utmost importance. On the other hand, although the civilian surgeon is untrained in military organization and transportation and field work, yet he is highly trained in the actual care of the patient. Obviously, therefore, the best results will be achieved by having the army service take charge of the field service and by placing the heavy surgical work of the base hospitals in charge of civilian units, and by having attached to each base hospital a board of consultants or inspectors composed of the most expert surgeons—practical surgeons upon whom can be placed the responsibility of the practical work and the formulation of general principles.

There are vastly important lessons to be learned from this war and a great service to be rendered. For the service it may render in the present and the good that may accrue to the future our country should not fail to avail itself of this opportunity.

SARCOMA OF THE BREAST

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Judging from the literature, one is forced to regard sarcoma of the breast as a comparatively uncommon disease. With few exceptions the contributions are limited to isolated case reports, or detailed studies of specific histological types.

Our material for the past ten years comprises 558 cases of breast tumor, including chronic inflammatory growths, both simple and specific. It was found that 22, or 3.9 per cent., of these were sarcomata of various types; 260, or 46.5 per cent., were carcinomata. Of the malignant tumors 7.7 per cent. were sarcomata. These figures may not represent the true relative proportions, as undoubtedly many of the cases of definitely benign tumors were not sent to the laboratory for histological examination.

According to their histological types, the 22 sarcomata are grouped as follows:

Fibromyxosarcoma	5	Cystosarcoma phylloides	4
Spindle-cell sarcoma	5	Giant-cell sarcoma	2
Round-cell sarcoma	4	Perithelioma	2

The fibromyxosarcoma and spindle-cell sarcoma are the most common types. Grossly, they vary in size depending on the length of time and the rapidity with which the tumor has been growing. The spindle-cell type is a lobulated tumor, firm and elastic to the touch, with a striated, whitish or pinkish cut surface. It often shows a capsule which may be complete, or defective in places. The fibromyxomatous tumor on the whole resembles the spindle-cell type, except that the former is usually softer and more succulent, and may even present small cystic and translucent areas.

Histologically, the spindle-cell tumors are composed of masses of rather small spindle-cells, with scanty protoplasm and elongated, deeply-

* Work done under the tenure of a George Blumenthal, Jr., Fellowship.

staining nuclei, without definite arrangement. Occasionally there is a tendency for the cell masses to group themselves about the blood-vessels. Multinuclear cells are found infrequently in these tumors. They are somewhat larger than the normal cell type, and contain two or three small nuclei arranged in the centre of the cell and almost filling it. Mitotic figures are present but are usually not very numerous. Fibromyxomatous tumors represent the same type of growth and are likewise composed of spindle-cells, which, however, are scattered in a matrix that shows œdema and myxomatous degeneration. In some of these degenerated areas branching cells are found supported in a mucoid stroma, that takes a purplish-blue tint with the hæmatoxylin stain. The origin of these two types of tumors is, in all probability, the interstitial connective tissue of the breast. The difference between the two consists of variation in the amount of intercellular tissue and the presence of degenerative changes in the stroma. The tumors grow slowly as a rule, and often remain well encapsulated for long periods of time. We consider some of these tumors to be midway between benign and malignant growths. Lymph-nodes in these cases show no tumor involvement.

The other types of sarcoma occurred with about equal frequency. Round-cell sarcoma, as we found it, was a rounded, smooth, firm tumor, usually single and occasionally multiple, in one or both breasts, and of fairly rapid growth. With this type of tumor the tendency was sometimes exhibited for the growth to break through the capsule and to invade the skin and deeper structures. The tumors on section have a cellular, whitish and homogeneous appearance. Scrapings from the cut surface show an abundant cellular content.

Histologically, the cells are round or oval in shape and distributed in groups. These tend to show a radial arrangement to the vessels, or are massed in large strands separated by fine fibrous tissue bundles. Relatively few mitoses are present. In this type of tumor it was possible to demonstrate by special staining methods (Bielschowsky) the presence of a fine fibrillar recticulum ramifying between the individual cells. Histologically the lymph-nodes are occasionally involved by tumor cells.

In two of our cases a previous diagnosis of primary lymphosarcoma of the breast had been made. The gross and histological pictures of these tumors correspond accurately with those of the round-cell sarcoma. We were unable to demonstrate that lymphoid tissue occurred normally either in the breast proper, or in the skin overlying it, nor could we find references in the literature to its occurrence, and we were forced to conclude that lymphosarcoma does not occur primarily in the breast,

and that the tumors so classified heretofore were in all probability small, round-cell sarcomata. We believe these tumors to have their origin in the interstitial tissue of the breast and that the cell type is really an undeveloped connective-tissue cell, or at least one that has not reached full maturity.

The relative proportion of cystosarcoma phylloides in our series differs from that given by Poulsen, Williams, Kausch and Finsterer, who found a predominance of this type of tumor. We may account for the discrepancy by the fact, that in these œdematous breast tumors, we are extremely conservative in our diagnosis of sarcoma, believing that most of them are fibro-adenomata with interstitial œdema. Only those cases in which the stroma shows marked cellular proliferation are classified as true sarcomata.

In our four cases the tumors were rather large, the largest being the size of a grapefruit. They are well encapsulated, irregularly lobulated, and soft tumors, usually involving one breast only, and are distinguished, grossly, by showing œdematous, papillary, intracystic excrescenses. Occasionally they present large cystic spaces, containing a yellowish fluid in some, and a more buttery substance in others.

Histologically, these club-shaped, and irregularly papillary, intracystic excrescences are composed of masses of periductal tissue projecting into dilated and cystic duct spaces. These spaces are lined by cuboidal epithelium which, in places, may be stratified. The stroma of these excrescences is markedly cellular. The cells themselves are closely packed, short spindle-cells with scanty, pale staining, granular protoplasm and a centrally placed, elongated nucleus. The ground substance presents an œdematous granular appearance. Atypical cell types, mitoses and other indications of rapid proliferation are missing, and on the whole the histological picture indicates a comparatively benign tumor.

The lymph-nodes, while not involved, always show a marked endothelial hyperplasia.

The tumor, as we have seen it, appears as a homogeneous, œdematous fibro-adenoma, in only part of whose extent the characteristic intracystic excrescences are present. Microscopically one gets the impression that these are due to a sarcomatous change in the periductal tissue, which mechanically causes the characteristic gross appearance.

The giant-cell sarcoma is a tumor of rapid growth. Our specimens were pear-sized tumors, encapsulated, and rather soft in consistence. On section they appeared succulent with varying areas, some rather vascular, others seemingly necrotic.

Histologically, these tumors consist of mono- and multinuclear giant-

cells which exhibit the tendency to arrange themselves in alveoli and to group themselves about the blood-vessels. The individual cells are large, polyhedral, or round, and have good-sized nuclei of irregular shapes, with deeply staining chromatin network. The giant-cells are predominant in the histological picture, although spindle- and round-cells are scattered very freely throughout. The cells show evidence of rapid proliferation, both mitotic and amitotic types of cell division being numerous. The entire structure is traversed by numerous dilated, thin-walled blood-vessels whose growth frequently does not keep pace with the actual tumor growth; areas of necrosis and hemorrhage are, therefore, of common occurrence. Inflammatory zones are also found scattered throughout.

In our studies we were unable definitely to formulate an idea as to the histogenesis of this type of tumor. In all probability it, too, represents a growth arising from a connective-tissue cell of the interstitial tissue.

The peritheliomata in our series were rounded, somewhat cystic tumors, well encapsulated and of rapid growth. They are single tumors and do not involve the surrounding tissues. On section they have a reddish color and appear very cellular. Histologically, they present branching masses of cells arranged about the blood-vessels. In places these cell masses can be traced into dilated spaces. Some areas present a tendency toward the formation of gland-like structures, between which there is a very cellular stroma. The cells are round, oval, or polyhedral in shape with oval or rounded, large, deep-staining nuclei, and little cytoplasm. Hyaline and myxomatous degeneration of the stroma is often seen. These tumors, in all probability, arise in the perivascular lymph-spaces.

An analysis of the symptomatology of these tumors shows no specific differential points which would enable one to distinguish, clinically, between the various types. The tumors occurred in women between the ages of twenty-nine and forty-nine years, the average being thirty-nine years. All the women were married, and the majority had borne children. In one patient, who had a round-cell sarcoma, the history obtained was that the appearance of the tumor coincided with the inception of lactation. It is, however, more probable that the tumor was present prior to the lactation period, and that its growth was vastly stimulated by the increased physiological activity. In two cases, one a fibromyxosarcoma, and the other a cystosarcoma phylloides, a history of trauma was obtained. In three other cases there was a history of a previous inflammatory condition. In two of these instances, both of them cystosarcomata, there was a history of mastitis, one eight years and one four

years previously. In the third case, a perithelioma, a breast abscess had occurred twenty-seven years previously, on the same side.

In three instances there was a history of a previous breast tumor; in two of these the tumors were in the opposite breast. In the first of these three cases, the first tumor had been removed six years before the appearance of the second; in the second case, one year previously; in the last case both tumors had appeared about the same time, the removal of one of the tumors antedating the removal of the second by two years. In no instance have we records of the histology of the first tumors removed.

In 57 per cent. of the patients the right breast was involved, in 33 per cent. the tumors were bilateral, and in 10 per cent. the tumor grew in the left breast. We lay no stress upon these figures, inasmuch as the total number of our cases is insufficient to enable us to draw conclusions. The duration of the tumors varied from a period of one week to nine years; the size varied from that of a walnut to that of an adult's head. We have the impression that the size of the tumor depended to a very large extent on the length of time the tumor had been growing.

The tumors all grew fairly rapidly, the one previously mentioned as having attained the size of an adult's head, had the longest duration, and even it had been noted to grow more rapidly in the last year. It seems rather characteristic of sarcoma of the breast, that the tumors show a period of latency and then, for some unknown reason, begin to grow rapidly. This could be accounted for by the fact that many of these sarcomata have their origin in previously benign tumors. Pregnancy, lactation, and trauma seen also, to a certain extent, to act as stimuli to the growth of these tumors.

In one-third of the cases, the skin was fixed to the tumor; in these instances it was thinned, reddened, and tense. In two cases there was simply an erythema, and the skin, though tense, was movable over the tumor. In only one case was the skin ulcerated, and that in a fibromyxosarcoma, which had grown to the size of an adult's head in six years' time. The skin in the neighborhood of the tumors usually showed dilated and radiating veins.

Pain existed as a prominent symptom in one-third of the cases. It was also noted that two-thirds of these were associated with tumors that involved the skin. We believe that the pain is due to compression, or stretching of the cutaneous nerves by the growing tumor, and in rare instances by actual involvement of the nerves.

The tumors do not, as a rule, show much tendency to infiltrate the deeper tissues.

In one case the nipple showed retraction; the tumor, a spindle-cell sarcoma, being situated just below it. In none of the cases was any secretion present.

The lymph-nodes rarely showed metastatic involvement, although in almost every instance large, soft nodes were palpable in the axilla, and occasionally in other regions, such as the supra- and infraclavicular fossæ. Microscopically, these nodes usually showed hyperplastic changes, and this was most marked with cystosarcoma phylloides. The one instance in which metastatic tumor was present in the lymph-nodes was a round-cell sarcoma.

Of the 22 cases in our series, 11 were subjected to the radical Halstead operation; one case had an amputation of the breast and dissection of the axilla; in one, a simple breast amputation was done; in five the tumor itself was excised; in one only a specimen was removed, and in the remaining three cases the type of operation was not described. With the exception of one patient, who died shortly after the operation, all the patients left the hospital in good condition.

In three cases there were local recurrences after the tumors had been excised; in one case, three weeks; in the second, one month, and in the third, six months after operation. Two of these were fibromyxosarcomata and one a round-cell sarcoma. In this latter case, the recurrence involved not only both breasts, the original tumors having been bilateral, but also the chest wall proper. In one instance, a fibrosarcoma, a tumor had been previously removed, at another institution, from the right breast, and had been reported upon histologically as carcinoma. In another case of fibrosarcoma of the breast, the patient had metastatic nodules in the skin of the back and face. A specimen was excised, the diagnosis was made, and the patient referred for treatment with Coley's fluid. The subsequent history of the patient we have not been able to ascertain.

Of the 18 operated cases, we were able to trace 11. All of the patients but one are alive, the time since operation ranging from four months to nine years. Among them were five fibrosarcomata, upon two of which radical Halstead operations had been performed. The other three were excised locally. The time since operation ranged from one to six years. There were two cystosarcomata, in one of which a Halstead operation had been performed six years ago, in the other an amputation of the breast with removal of axillary glands and fat, four months ago. One case of round-cell sarcoma died of shock following a Halstead operation; a second case, after bilateral local excision, returned in six months with recurrence. Two cases of peritheliomata, for which the

radical Halstead operation was done two and nine years ago, respectively, are alive and well now. In four other cases a local excision was practised. In two the tumor promptly recurred; in one instance two weeks, in the other, one month, after operation.

We have attempted to group and classify all the reported cases, searching the literature as far back as 1858, when Velpeau's book was published. Many of the papers cannot be utilized because of the absence of clinical or histological data. The following are those available for study.

Including our own cases we have collected, from the literature, 435 sarcomata of the breast. These include practically all types of sarcoma. By far the greatest number were of the spindle-cell type, of which there were 136, or 31 per cent. Next in frequency was the round-cell tumor, of which there were 62, or 14 per cent. It is, of course, rather rare to see either pure round- or spindle-cell types, as in most instances the one or other cell form predominates. Cystosarcoma phylloides followed third, with 54 cases, or 12 per cent. Fourth in frequency was a group classified as adenosarcoma by the older writers, which corresponded to the periductal sarcoma by Greenough and Simmons, which probably represent sarcomatous change in a pre-existing fibro-adenoma. These totalled 26 cases, or 6 per cent. It is probable that some of these periductal fibro-adenomata in their later development become cystosarcoma.

Rarer tumors, as the osteosarcomata reported by Stilling (all of which were fatal), the chondrosarcomata mentioned by Bland Sutton, some of which were also calcareous, are histologically of interest. Another interesting condition is that observed by Legrain in the native women of Algeria, in whom multiple tumors occurred in both breasts, the type being either spindle- or round-cell. These tumors frequently ulcerated and did not metastasize, death, as a rule, resulting from a sepsis following infection of the eroded tumor.

The other types occurred with about equal frequency, though in some of the earlier papers, the nomenclature and classification varied markedly from our present ideas.

Etiology.—Heredity apparently plays a very small rôle; Schroeder, in fact, could find no evidence of this relationship. Trauma is noted in about 10 per cent. of cases. Occasionally there is a previous history of mastitis. Pregnancy and lactation seem merely to be coincidental, although pre-existing tumors very often show a tendency to a more rapid growth during these periods. Eighty per cent. of the women were married and had borne children. In but nine cases was the male breast involved, which would seem to indicate that the physiological activity,

	Osteosarcoma	Spindle-cell Sarcoma	Round-cell Sarcoma	Cystosarcoma	Fibrosarcoma	Plexiform Sarcoma	Myxosarcoma	Lymphosarcoma	Giant-cell Sarcoma	Chondrosarcoma	Polymorphous-cell Sarcoma	Melanosarcoma	Osteochondrosarcoma	Adenosarcoma	Sarcomatous Degeneration of Fibroadenoma	Cystoid Sarcoma	Telangiectatic Sarcoma	Alveolar Sarcoma	Perithelioma	Unclassified
Greenough and Simmons	..	..	..	..	..	..	5	..	..	..	..	..	..	..	..	..	..	..	..	..
Stilling	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Gross	4	106	42	..	..	..	..	2	8	2	..	2	..	..	..	11	11	3	..	..
Poulsen (9.3 per cent.*)	..	3	1	14	4	..	..	..	1	..	3	..	..	3	..	..	..	..	..	4
Horner (8.8 per cent.*)	..	5	..	2	3	..	..	..	..	1	..	..	..	4	..	..	..	..	..	..
Rosenstein (5.3 per cent.*)	..	1	3	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kausch (7–10 per cent.*)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Finsterer	..	10	4	18	..	..	5	1	..	..	..	..	..	..	..	..	..	..	..	6
Deaver	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11
Powers	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..
Kettle (*a*)	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Schrœder	..	1	1	3	2	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..
Gorham	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..
Segoud and Renaud	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Bland Sutton (*b*)	..	..	..	..	..	..	..	..	..	5	..	..	..	..	..	..	..	..	..	..
Speese	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Bockenheimer	..	..	..	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
Beckton (2.3 per cent.*)	..	2	4	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..
Mornard	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..
Thompson	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
Boddaert and Vererullie	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sehrt	..	..	..	..	..	..	..	..	..	..	..	..	8	..	..	..	..	..	..	..
Vignard	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Schlagenhaufer (*c*)	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
Stone (*d*) (5 per cent.*)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Deladrier	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Morton (*e*)	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..
Gebeler (*f*) (10 per cent.*)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Hoffmann	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mainz	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..
Schuchardt (*g*)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
Schmidt	..	..	..	..	..	11	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Williams	..	..	1	..	..	..	..	..	..	..	2	..	..	17	..	..	..	..	1	..
Purcell	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Steinberger	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Tillaux	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Chambers	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Pilliet	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Chretien	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
de Schweinitz	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Haslam	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Billroth	..	..	1	..	..	..	..	1	1	..	..	1	..	..	..	..	..	..	..	..
Velpeau	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Volkman	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
v. Meckle	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Authors	..	5	2	4	5	..	..	..	2	..	..	..	..	..	..	..	..	..	2	..
Total	7	136	62	55	17	12	11	5	15	10	9	3	8	26	2	11	11	3	3	29

* Percentage of sarcoma in breast tumors. (*a*) Carcinoma in same breast. (*b*) With calcification. (*c*) With carcinoma. (*d*) One hundred tumors, no classification. (*e*) With calcification. (*f*) Thirty-four cases, no classification. (*g*) Male.

or the physiological retrogression, of the female breast has some etiological significance. Most of the tumors seem to arise in breasts that have already functionated, and some represent a malignant change in a previously existing benign tumor. The average age was forty years, but the range extended from four months (Chambers), to eighty-eight years.

Symptomatology and Course.—Usually the first thing noted is the presence of a small hard mass. The tumor may grow rapidly from this time, or after a period of quiescence may suddenly begin to proliferate. The tumors were, as a rule, single, though they sometimes occurred as multiple masses involving either one or both breasts. Pain is rather infrequent, occurs in about 40 per cent. of the cases, and was usually a late symptom. The skin and deep parts were rarely involved. Occasionally the skin was tense and reddened, the cause of which was pressure of the growing tumor. It was rarely adherent and more rarely still was it ulcerated. The tumors varied in size from a walnut to an adult's head.

The nipple was rarely retracted and secretion from the breast was only occasionally present and usually accompanied cystic tumors. Cachexia was rare.

The *histology* of the tumors varied markedly, for not only were all types of sarcoma found, but occasionally carcinoma and sarcoma were found growing side by side as separate tumors, or the stroma of a preexisting carcinoma was found to be undergoing sarcomatous change.

While the regional lymph-nodes were very often enlarged and palpable, metastatic tumor involvement of these structures was rare. We were able to find records of thirteen cases showing histological involvement of the lymph-nodes; this corresponds to 3 per cent. of the total number of cases. In most instances, the lymph-node involvement occurred with the round-cell type of tumor.

Prognosis.—The cystic types of tumors seem to have the best prognosis. These really represent cystic fibro-adenomata, in which a malignant change has taken place in the stroma. In these cases 75 per cent. are cured, even when a local excision is done. In the solid sarcomata, the prognosis is not so good; the mortality in this type being as high as 42 per cent. Tumors of the round- and spindle-cell variety offer the least favorable prognosis. The prognosis, on the whole, is better than in carcinoma, even though metastases and recurrence are fairly frequent.

Treatment.—The consensus of opinion seems to be that the radical operation is advisable. Local and general recurrences take place, however, even after such extensive procedures. On the other hand, simple

excision has often resulted in permanent cure. The cystic type of tumor and the less cellular spindle and fibrous types lend themselves more to conservative operations. The cellular solid tumors, such as the round- and the giant-cell tumors, are usually very malignant and demand radical operation.

Thirty-seven per cent. of the collected cases had local recurrences; 15 per cent. had metastases. We were unable to obtain accurate figures on the types of operations performed. The metastases are found in the lungs, liver, brain, dura, retroperitoneal and mediastinal lymph-nodes, axillary and subclavian lymph-nodes, kidney, heart and pleura. In other words, from their location, it would seem that the metastases occurred by way of the blood stream. Poulsen has reported 63 per cent. of cured cases; Homer 61 per cent.; Goebele, 70 per cent.; Finsterer 56 per cent., and our figures, including all collected from the literature, show 63 per cent. of cures.

Judging from these results we may say that the prognosis in sarcoma of the breast treated radically is good.

We are indebted to Dr. F. S. Mandlebaum for the privilege of studying the material both from the laboratory and from his private collection. We also thank the attending surgeons, Drs. A. G. Gerster and H. Lilienthal, for the use of the ward histories. For the private records of some of the cases we are indebted to Drs. Brill, Lilienthal, Moschcowitz, Berg, Ware and Koles.

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CARCINOMA OF THE STOMACH *

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One can hardly consider carcinoma of the stomach without first speaking of its most difficult problem, the diagnosis, and especially the early diagnosis. That this problem is of vital interest to the surgeon is evident when we recall:

(1) That cases generally come to us in an advanced stage, with a late diagnosis.

(2) That the difficulties of early diagnosis are inherent in the insidious nature of the disease.

(3) That an early diagnosis is the greatest desideratum in gastric cancer, as on it depends the possibility of successful treatment.

(4) That the surgical treatment of early cases gives a low mortality and a satisfactory result.

(5) That in many cases the final test of diagnosis must be made by exploration.

Most cases in hospital practice come to the surgeon with a late diagnosis, not through the fault of the hospital internist so much as because the patients do not apply for hospital treatment until late, as they regard chronic dyspepsia as a trivial matter or as a necessary affliction to be stoically endured.

In looking over hospital records of gastric cancer I have been struck with the number of cases that come into the medical service to die in a short time or to go home as hopeless, without having been seen by the surgeons. This is due to the insidious nature of the disease in many cases. But physicians, and surgeons as well, are not free of all responsibility, as cases of dyspepsia are so apt to be treated by a little diet or some dyspepsia remedy, without anything like a careful examination. We are in urgent need of a propaganda of education of both the patient and the physician, in the matter of chronic dyspepsia and its relation to gastric cancer and ulcer, before we can hope for much better results. The importance of this is emphasized by the fact that gastric cancer is the commonest form of cancer, constituting about 30 per cent. of all cases.

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* Read before the New York Surgical Society, March 10, 1915.

I have notes on 36 cases of gastric cancer on which I have operated in the last few years, 30 at or near the pylorus, and 6 at the cardia. These were mostly advanced cases, *i.e.*, late diagnoses. This series is too small to be of much statistic value, though I have given the percentages in many cases for comparison.

In any series of cases of gastric cancer there are two groups: (1) Those that appear to be cancer from the outset. (2) Those giving a more or less long gastric history resembling (*a*) the typical history of ulcer, or (*b*) an irregular ulcer history. Nineteen of my 30 pyloric cases gave a history of apparently primary cancer; 11 (or 36.6 per cent.) of a preceding gastric condition resembling ulcer.

As W. J. Mayo [1] has well expressed it, "The early diagnosis does not depend on any sign or symptom due to the cancer itself, but on the mechanical conditions produced by the growth." In other words, there are no signs or group of symptoms that are pathognomonic of the disease in its early stages. All the symptoms present in the early stages of gastric cancer are common to other ailments of the stomach or alimentary tract, or to several general conditions, such as intestinal tuberculosis, anæmia, chronic nephritis, etc.

Given a patient of over forty years, with persistent symptoms of epigastric pain, vomiting, anorexia, loss of flesh and strength, and anæmia, with a palpable epigastric mass or a sense of resistance, we should be almost sure of the diagnosis of carcinoma of the stomach. This would not be an early diagnosis and in many cases one or more of these symptoms or signs may be absent, rendering the diagnosis more uncertain.

Examining the symptoms more in detail we find that the age limit cannot be definitely fixed. Only 4 of my patients were under 40, the youngest 32, the oldest 72, and the average 53 years.

The pain is commonly not severe, but more a feeling of distress or a dull ache, increased by food and relieved in whole or in part by vomiting. Out of my 30 cases of pyloric carcinoma pain was absent in 4 and very slight in 3 others. It has none of the importance as a pathognomonic symptom that it has in ulcer.

Though vomiting occurs in nearly all cases, 3 of the above 30 cases had none, one vomited once and another but once or twice. Four noticed blood in the vomitus and in four it was coffee-ground. Vomiting may not occur until late in the disease or it may cease toward the end. Gas, causing painful pressure, relieved by regurgitations, is about equal to vomiting in diagnostic value.

Pain, vomiting and gas are not characteristic, for they occur in all

gastric ailments and in many others, but anorexia is more pathognomonic of cancer and serves to distinguish it from ulcer. Only 3 out of the 30 cases retained their appetite. It is lost early and its loss is often the first symptom to attract attention to the stomach.

Progressive loss of flesh and strength is another symptom most suggestive of cancer. Only 2 of the 30 pyloric cases claimed no loss of weight or strength. Twelve stated the amount of weight lost, which varied from 15 to 60 pounds and averaged 40 pounds. All those who had retained their appetite and those who had no vomiting lost much weight, which seems to be independent of the food intake.

Anæmia is another very constant symptom, only one of my cases having a normal percentage of hæmoglobin. It averaged 53.9 per cent. in 17 cases in which it was recorded. The skin often has a yellowish hue and is very dry. The facial appearance is often typical and may be of diagnostic value. The pallor and wasting give a pinched wrinkled look about the eyes, nose and mouth and there is a hopeless dejected expression.

A mass, often of considerable size, was palpable in 20 of the 30 pyloric cases (66.6 per cent.), and an indefinite sense of a mass in 5 more (16.6 per cent.). That a mass does not indicate an inoperable condition, as was formerly supposed, has been shown by all recent reports. Among the 13 cases resected a mass was palpable in 8 (61.5 per cent.), and an indefinite mass in 2 others (15.3 per cent.). Free mobility of the mass is a cheering sign of operability.

The motility of the stomach may be readily tested by the presence of raisins in the lavage water 12 hours after their ingestion. They are found in over 50 per cent. of cases and indicate mechanical obstruction.

These cases as we see them may be diagnosed clinically if, in addition to chronic dyspepsia, as indicated by pain, vomiting and gas, there is persistent loss of flesh and strength with anorexia, anæmia, and the presence of a mass. But these symptoms are neither constant nor do they enable us to make a very early diagnosis.

The gastric analysis and a series of X-ray plates are made in all cases. The absence of free HCl is the rule, but there are not a few exceptions, especially in the group developing on an old ulcer, and it occurs in many general conditions, like anæmia, tuberculosis, chronic nephritis, and syphilis of the stomach. It helps to differentiate cancer from ulcer of the stomach. In the cases where it was recorded 80 per cent. had no free HCl. Lactic acid in excess is only found in the absence or low percentage of free HCl and is not present in early cases.

Smithies [2] found the Oppler-Boas bacilli in 93.8 per cent. of cases

of gastric cancer by the differential agar stain. According to Friedenwald [3] occult blood in the stools occurs in 92.5 per cent. of cases.

The glycyltryptophan test, that I thought a few years ago was very promising, has disappointed expectations, as it is not infrequently negative in cancer and positive in other conditions. Smithies [2] found it positive in 40 per cent. in 141 cases of cancer in the Mayo Clinic.

The Wassermann reaction should be tested in every case in order to help differentiate syphilis of the stomach.

The X-ray is our best ally in confirming or disproving a suspicion of gastric carcinoma. At present our best hope of improvement in the diagnosis of gastric cancer lies in the development of the X-ray. Carman [4] in the Mayo Clinic claims that the X-ray shows diagnostic signs in 93 per cent. of the cases of gastric cancer examined. Cole [5] made 96.9 per cent. of successful diagnoses by serial röntgenography in 97 cases of various gastric lesions, confirmed by operation. Owing to the expense involved this method cannot be applied as a routine. The average X-ray plates will not give as good results as those obtained by Cole or Carman.

There are numerous tests which are outside the scope of this paper, that we need only mention. Many are useful in differentiating between gastric cancer and ulcer. Among these are Gluzinski's test, recommended by Kocher and thought by Nicholaysen [6] to be the best test of the secretory function of the stomach. It differentiates between ulcer and cancer when there is still some free HCl present. In the presence of achylia or a low free HCl content Smithies [7] found a high percentage of soluble albumin in 78.4 per cent. of 215 cases of gastric cancer. In addition the hæmolytic test and the formaldehyde titration index may be mentioned.

None of the tests give uniform results. All may give positive results in a smaller percentage of non-cancerous cases and most of them require an elaborate technic. Most of them are helpful or confirmatory, in connection with clinical symptoms and physical signs, no one or all together can establish the diagnosis alone.

" The diagnosis of cancer of the stomach," says W. J. Mayo,[8] " cannot often be made early enough to obtain a radical cure by operation, but a diagnosis of some condition of a surgical nature, probably cancer, can be made in time to permit operative interference (resection) in more than one third of all cases." The general diagnosis of a surgical gastric condition is far easier than the specific one of cancer of the stomach. The physician should delay as little as possible in convincing himself that medical treatment is ineffective in a given case. The policy of

"watchful waiting" and the use of medical means for a long period in the hope, rarely justified, that the condition may prove benign has sealed the fate of many cases of gastric cancer. In most cases the condition is surgical if not malignant.

Exploration is the final test, and the difficult task of the diagnostician is to decide which of these patients shall submit to it. Exploration must be done early to give the patient a fair chance. To be sure we cannot always distinguish between cancer and indurated ulcer even on exploration. I have had the not uncommon experience of doing gastro-enterostomy for what I thought to be a cancer of the pylorus, giving a bad prognosis, and seeing the patient two and a half years later in perfect health. The condition and its treatment, however, were surgical. In the Utrecht Clinic [9] the result in 21 per cent. of the cases of gastro-enterostomy for supposed cancer proved the condition to be indurated ulcer.

In any event the present surgical procedure in both doubtful indurated ulcer and cancer of the pyloric portion is the same, *i.e.*, resection. This is due in part to the impossibility of diagnosing with certainty on exploration between pyloric cancer and indurated ulcer, and in part to the danger of carcinoma being engrafted on a chronic ulcer, whether we believe with the Mayo Clinic that it occurs in about 60 per cent. of cases, or, with Continental authorities, that it occurs far less frequently.

Hence, given a patient over forty years old, with persistent dyspepsia, without apparent cause and not relieved after a few weeks of medical treatment, accompanied by loss of flesh, strength and color, exploration is to be very seriously considered. This is more imperative if one or more of the various tests or signs are present. In the interest of the patient we must avoid delaying exploration until we are sure of the diagnosis. The X-ray should be employed as a routine in all these cases. It may increase our suspicion or even turn it into certainty. Like all other tests the earlier the case the less certain is the result of the X-ray, and the more skill is required in its use and its interpretation.

The fact must not be lost sight of that what is to be sought for by every means in our power is an early diagnosis. Hence the necessity for an early exploration, which is a relatively safe operation. The risk of exploration is less than the risk of delay. Indiscriminate exploration in advanced cases is to be condemned, especially if no obstruction of the pylorus is present that may be relieved by a palliative operation. These explorations give a considerable mortality, do no good, and discredit gastric operations in general. Of course it is inevitable that not a few

cases are explored that prove worse than they appear to be, and are unsuitable for operation. It is only right to give these patients the benefit of the doubt, if they are fit to undergo exploration. In point of fact, practically every operation on the stomach is to a greater or less extent exploratory at the outset, until the exact condition is exposed and explored.

Treatment.—There is no curative medical treatment. Resection offers the only cure. Mayo's statistics [10] show that out of 1000 cases of gastric cancer, operated on prior to 1913, 378, or nearly 38 per cent., were resected, and he states that "at least half the cases of cancer of the pyloric end of the stomach may be recognized by our present means of diagnosis early enough to allow the radical operation." These figures are more favorable and encouraging than those of most other clinics.

The ideal and only curative operation in gastric cancer is resection, or partial gastrectomy, which is applicable to cancers at the pyloric end (75 per cent. of cases), that are diagnosed early enough. Prolongation of life and relief of distressing symptoms are enough to justify resection in these cases. There is also the prospect of a 5-year cure in about 25 per cent. and of a 3-year cure in 38 per cent. of the 90 per cent. who recover from the operation in the Mayo Clinic.[11]

After opening the abdomen we first determine whether there is any contra-indication to operation on account of metastases in the liver, peritoneum (especially in the pelvis), pancreas or intestines. In the Mayo Clinic the percentage of metastases was 18 per cent. Second, if there are no visible metastases, can the growth be removed? This depends upon the extent of stomach involved, but more especially upon the adhesions or superficial extensions to neighboring organs. Formerly, owing partly to Mikulicz's statement in 1903,[12] that adhesions or superficial extensions to the pancreas increased the mortality from 27.5 to 70 per cent., this condition was considered almost a contra-indication to operation. More recently W. J. Mayo [11] has shown that it does not increase the mortality very greatly, not over 1 per cent., and we now resect many of these cases. Adhesions to the transverse mesocolon must be carefully handled to avoid interfering with the blood supply of the transverse colon. I have peeled the stomach off of the mesocolon successfully in such a condition. In general, adhesions suggest the probability of extension in continuity of the growth, and must be dealt with accordingly. Adhesions when inflammatory do not contra-indicate operation.

If enlarged lymph-nodes are found that cannot all be removed I believe in resection, because it is proved (1) that not all such enlarged

nodes are carcinomatous and (2) that resection gives a longer and more complete relief than gastro-enterostomy, when a complete removal of carcinomatous glands is impossible. In 2 of my cases of resection for cancer the enlarged lymph-nodes removed proved to be simple hyperplasia, on microscopic examination. More than 20 per cent. of gastric cancers show no cancerous involvement of the lymph-nodes.[13] Three of Rotgan's [14] cases, where the glands removed were carcinomatous,were alive and free of recurrence over 3 years.

In spite of the lowered percentage of hæmoglobin in most of these cases, resection is surprisingly well borne, for there is very little loss of blood in the operation by the present technic. I have only lost one case among the 13 cases of resection, a mortality of 7.7 per cent. This was due to pneumonia in a patient otherwise doing well, though the hæmoglobin was only 30 per cent. In such anæmic cases we must seriously consider the question of a two-stage operation. We may limit the first stage to the gastro-enterostomy or, better still, if possible, add to this a unilateral exclusion, dividing the stomach as we would in the complete operation. The first operation enables the patient to gain in nutrition and strength, divides the trauma, and so increases the margin of safety. This is particularly applicable to the very poorly nourished and anæmic patients, that are poor surgical risks.

Another means at our disposal in such cases is the direct transfusion of blood. In one case of resection I employed it several days after operation. The transfusion of 1000 c.c. of blood raised the hæmoglobin percentage by one-third and established a convalescence more rapid than usual. It was planned to use it earlier but a donor failed. Another cancer case had 1300 c.c. four days before operation, with a gain of 20 per cent. in hæmoglobin. In a case of very indurated pyloric ulcer, with repeated hemorrhages, I used it directly before operation, to render it an operative risk. All these were done by Dr. Lindeman by his method.

The ultimate results in my cases were not so good, owing to the advanced state of the disease at operation. One had merely a polypoid condition at the resected pylorus. After improving for a time he grew weaker, refused food, though he could swallow it, and died in 7 weeks. At autopsy there was found an adenocarcinoma of the cardiac portion, which was not noticed at the operation Furthermore, he had chronic pulmonary tuberculosis and acute infectious endocarditis. Another, the youngest patient in the series, whose pathological report showed colloid carcinoma on the basis of an old ulcer, extreme vascular changes, and the presence of what seemed to be small gummata, sug-

gesting a luetic process, was well for 4 months. After this there was a recurrence of symptoms and a second operation revealed a peptic jejunal ulcer at the stoma. She died soon after, not having the strength to rally after the second operation. Another patient, who presented a large mass to the right and a little above the umbilicus, adherent in this position to the abdominal wall, died from recurrence within a year.

The others had a longer lease of life. In one the pathological report of a large tumor was colloid carcinoma, or an extreme example of gastritis polyposa, with excessive degeneration.

All were operated by the Billroth II method except one, in which Kocher's modification of the Billroth I method was used. In the latter case it was necessary to do a gastrojejunostomy, six weeks later, on account of symptoms indicating obstruction at the outlet of the stomach.

There is little to add in the matter of technic. I always sever the stomach with the cautery or cauterize the cut surfaces for hæmostasis and to avoid the possible contamination of the wound with cancer cells. The Polya-Reichel method, in which the opening in the stomach is sutured into the jejunum to form the gastrojejunostomy, is attractive as it should shorten and simplify the operation.

If we cannot do a resection what can we do to palliate? Gastroenterostomy is commonly done but the results are disappointing, unless there is pyloric obstruction, and a carcinoma at the pylorus not infrequently holds it open instead of stenosing it. Even when the pylorus is stenosed the results are disappointing, for there is not a little mortality in these advanced cases, and the sloughing, ulcerating tumor remains in the stomach cavity; hence the appetite does not improve greatly and there is little gain in either weight or strength.

I believe that some of these cases offer an excellent field for v. Eiselsberg's unilateral exclusion, when the extension and the adhesions of the pyloric tumor are such as to render a safe resection very doubtful. Of course it adds somewhat to the length and severity of the operation and can be used only in selected cases. v. Eiselsberg first proposed his exclusion method for just such cases. I employed it in a case about a year ago and the result was more satisfactory than simple gastro-enterostomy. The patient lived nine and a half months, though it was an advanced case. There was one peculiar result that we had not counted on. The disuse of the pylorus as a passageway allowed the tumor to proliferate faster than it ulcerated, so as to tightly close the pylorus. The discharge from the ulcerating tumor was thus dammed back and worked out through the abdominal incision, from time to time. How-

ever, I think the method worth employing in suitable cases. If the patient improves markedly the attempt at resection in a two-stage operation may later be made.

One of the 10 cases of gastro-enterostomy died two days after operation, of pneumonia; another after 11 days, from progressive weakness; another in 4 weeks, from a perforation of the duodenum, which the tumor had invaded. The others lived a longer time or were lost sight of, but none experienced the relief from the operation that one would expect from analogy with cases of pyloric ulcer. One had a "leather bottle" stomach (linitis plastica), and experienced much relief from the operation. He died one and a half years later with cancerous metastases in the brain.

One case had a gastro-enterostomy done in Philadelphia 5 years before. He was well until shortly before the operation, at which the stoma was found nearly closed by a large adherent tumor. A new stoma was made further to the left. This is interesting as the length of time since the first operation proves that the original condition was an ulcer. The occurrence of cancer after a gastro-enterostomy for ulcer is not common. Paterson says [15] that it occurs in only 1 per cent. of cases and uses the fact as an argument against the common occurrence of malignant degeneration of gastric ulcers. In one other case, in which exploration was done, a gastro-enterostomy had been made 7 months before, with relief for 2 months. The time since the operation was here so short that we can draw no similar conclusion as to the character of the lesion.

A form of gastrojejunostomy that I have used in two of these cases, and a few cases of ulcer, where the posterior surface of the stomach was not available on account of adhesions, is the retrocolic short loop anterior gastrojejunostomy. The loop of jejunum is passed through the transverse mesocolon and then through the gastrocolic omentum. It has given good satisfaction.

Jejunostomy was done in one case but the very depleted patient only survived a few days.

Carcinoma of the cardiac end of the stomach has been present in my series of cases 7 times in 36 cases, *i.e.*, 19.4 per cent. The diagnosis is usually not difficult. In only one case was there no difficulty in swallowing and no obstruction to the passage of the stomach tube. In another case difficulty in swallowing was not complained of, but the passage of the tube was stopped by the growth. All had epigastric pain, often severe, and in two instances radiating to the back. There is usu-

ally no vomiting, but often regurgitation or gagging after eating, or the food has to be washed down by drinking water frequently. In one case the diagnosis was confirmed by Dr. H. H. Janeway by the use of the œsophagoscope.

No radical operation is at present applicable to these cases. In 5 cases I have done gastrostomy by Senn's or Kader's method, using a No. 22 or 20 (French) catheter. As to the results, the pain may not be greatly influenced, but the nutrition is much improved. After the rest given the œsophagus by the use of the tube for feeding, the patients have almost always found that they could swallow better and thereafter continued to take food partly by the mouth and partly through the tube.

In 7 cases exploration revealed an inoperable condition, hence nothing was done, as there was no indication for gastro-enterostomy. It is most desirale to limit these operations as much as possible. If there are signs of free peritoneal fluid, infiltration of the umbilicus, an evident carcinomatous liver, etc., no operation should be done. The X-ray also may disclose a clearly inoperable condition and contra-indicate exploration.

Prophylactic treatment may be directed toward the precancerous conditions, ulcer and chronic gastritis. This includes the proper medical treatment of both conditions and earlier operation on gastric ulcer, with resection for doubtful indurated ulcers.

In conclusion we may state:

1. That an early diagnosis is the great desideratum toward which the efforts of both the internist and the surgeon should be directed.

2. That resection gives excellent results, a low mortality, a fair proportion of complete cures, and a considerable prolongation of life and comfort, when ultimate cure does not result.

3. That some cases may be more safely operated by the two-stage method or after the direct transfusion of blood.

4. That gastro-enterostomy is rather disappointing in its results and its mortality, and that unilateral exclusion offers an improvement in the results.

5. That simple exploration should be restricted as much as possible.

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LEATHER-BOTTLE STOMACH

WITH REPORT OF A CASE IN WHICH SUBTOTAL GASTRECTOMY WAS DONE

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Of the more than twenty synonyms for this disease the most frequently seen are—linitis plastica, cirrhosis of the stomach, chronic interstitial gastritis, and sclerosis of the stomach.

These terms are used to indicate a pathologic process in the stomach walls which results in a diffuse thickening and hardening, involving a greater or lesser portion or all of the organ, and producing either a diminution or increase, usually the former, in the capacity of the stomach.

Brinton proposed as a name for the lesion "linitis plastica," on the theory that it was essentially a benign inflammation of the filamentous network of the areolar tissue. He described the disease as insidious, slowly progressive and in the end fatal.

Rokitansky, on the other hand, declared the lesion to be fibroid cancer. Since the observations of Brinton and Rokitansky were published, as before, some writers have declared the lesion to be benign and others have declared it to be malignant.

That some of the cases reported by Brinton were scirrhous cancers there is no doubt. Lyle's paper is a complete exposition of our knowledge on this subject up to the time of its publication (1911) and includes an abstract of all reported cases up to that time, both benign and malignant, together with the bibliography. His conclusions are as follows:

1. "Diffuse fibrosis of the stomach occurs without cancer."

2. "A large number of the cases reported are frankly cancer and have no claim to be termed linitis plastica. On the other hand, some of the cases reported as linitis plastica are scirrhous cancers. 'This is no doubt true of some of Brinton's cases, for at that period the microscopical examinations were of necessity inadequate.'" (Welch, personal communication.)

3. "The clinical diagnosis is rarely possible and at the best is always problematic. The microscopical diagnosis necessitates a careful and prolonged search for nests of cancer cells in order to exclude scirrhus."

4. "There is a possibility that the condition may be a precancerous state, bearing somewhat the same relation to scirrhous cancer that gastric ulcer bears to gastric carcinoma."

5. "The treatment is surgical."

KROMPECHER and MAKAI (1912) present a careful study of the subject. They consider the acquired benign hypertrophies of the stomach (sclerotic or leather-bottle stomachs) and the malignant acquired hypertrophies of the pylorus and entire stomach. They sift the question of the occurrence of the benign type, what the criteria are in this as well as in the questionable pylorus hypertrophies, and in which groups of malignant tumors the small-cell scirrhous types are to be placed. A portion of the cases present a definite picture of small-cell scirrhus; another that of an inflammatory nature; in between are groups of cases of thickening and contraction of the whole stomach or the pylorus, the histologic characteristic of which is not yet clear. On the basis of their studies the authors come to the conclusion that even those changes whose explanation is not free from objection must be regarded as cancer of peculiar microscopic structure. The cells of such cancers resemble granulation cells rather closely, and even their arrangement is not that of typical cancer. There are insufficiently differentiated cancers in which, as in basal-cell carcinoma, a marked hyaline transformation of the exuberant connective-tissue is rather to be noted.

Since these insufficiently differentiated cancers are characterized by a disseminated growth which gives them a peculiar characteristic picture, these small-cell scirrhus cases may indeed be designated as disseminated cancers.

A separation of pyloric hypertrophies into benign or malignant is possible and necessary. As to the occurrence of benign inflammatory contraction of the whole stomach they are very skeptical, for they have found only malignant processes in such instances.

BLAND SUTTON (1904) reports three cases and refers to the fact that many cases have been observed wherein the stomach was converted into the semblance of a leather bottle, and in which it was practically impossible to determine whether the lesion was malignant or benign. He says these changes may not be uniform but may be confined to a relatively small area of the stomach. Sutton also calls attention to the frequency with which gastro-enterostomy for supposed inoperable gastric carcinoma is followed by complete recovery.

CURTIS reported a case of linitis plastica benign, but because of protests against this diagnosis went over the sections again and found a small area which was cancerous.

JABOULAY did a total gastrectomy for this condition and one year later removed the rectum of this same patient for a similar lesion. On the other hand, Lyle and others have reported cases of leather-bottle stomach which recovered after posterior gastrojejunostomy. Lyle's case was living three years after operation.

SHELDON reports a case in which he did a gastro-enterostomy and the patient eight years after was in perfect health. He says that benign diffuse sclerosis of the stomach does occur but is a rare condition; that it is possible that a carcinomatous process may develop in a stomach already the seat of chronic sclerosis, but that it is improbable that such a case has been reported.

BRET and PAVIOT report a case of sclerosis of the stomach in which no evidence

of malignancy could be found in the stomach wall, but the perigastric glands were cancerous. Johnson reports a case in which he did a posterior gastro-enterostomy and the patient made a practically perfect symptomatic recovery. The dates are not given in Johnson's report but it seems to have been made soon after the operation. George Woolsey, in discussing Johnson's report, said he had had a similar case in which improvement followed gastro-enterostomy but the patient died within two years thereafter from carcinoma of the stomach.

MOYNIHAN reports a case in which he did a complete gastrectomy for leather-bottle stomach. The lesion in this case was proven to be an atrophic scirrhus with extensive fibrous hyperplasia of the submucous coat. The patient recovered from the operation and remained well for three years when he began to fail and died four months later of anæmia. An autopsy showed no malignancy anywhere in the abdomen.

ROBSON recognizes a benign and a malignant type of cirrhosis of the stomach and points out that the course of the benign type is much slower than that of the malignant type.

W. J. MAYO says they have had in their clinic "perhaps twenty cases of so-called leather-bottle stomach, and all those they have been able to excise and make sections of proved to be malignant, although sometimes many sections had to be cut before a malignant area was found."

KROMPECHER's opinion is that the disease is not a mere disease of the pylorus but may and does sometimes involve the intestines and peritoneum and is the result of cardiac insufficiency and arteriosclerosis.

That similar changes to those occurring in the stomach in leather-bottle stomach also occur in both the large and the small bowel is proven by several reported cases. The pathologic findings in some of Krompecher's cases seem to bear out his contention that the sclerosis is the result of cardiac and vessel changes. In Lyle's case also there was cardiac insufficiency. One is reminded here of the relationship supposed by some to exist between fibromata of the uterus and cardio-vascular changes. Lyle says that in going over Fenwick's cases he was impressed with the likeness they presented to "the lesions of severe anæmia." It will be recalled here that Moynihan's case above reported died of anæmia with no signs of a return of the sclerosis. The writer has succeeded in collecting the reports of 67 cases, including both the malignant and the benign, in which the duration of symptoms is given, and finds that out of 10 malignant cases there were 3 that had complained two months or less. In 5 benign cases there was but 1 that had complained less than two months. (In this case the duration of symptoms is given as one month.) The average duration of symptoms in 39 benign cases was 41.1 months. In 28 malignant cases the average duration of symptoms was 18.9 months. These figures do not include my own case.

The disease is more common in men than in women and is essen-

tially a disease of adult life. It is interesting and important to note as bearing upon the question of malignancy, that the age incidence is practically the same in the group reported malignant as in that reported benign. This adds weight to the argument that some and perhaps many of the cases reported as benign were really malignant. Ulceration is rare but peritonitis, as evidenced by adhesions, etc., is common. It is well to recall here that Viellers has reported two typical benign cases complicated with tuberculosis and says this complication is common. The characteristic pathologic change is a thickening and hardening of the walls of the stomach which usually results in a decided diminution of the size of the cavity, but in rare cases there may be dilatation. There are no distinctive symptoms of linitis plastica. The diagnosis has been made before operation or autopsy but three times (Boulton 1862, Deguy 1896, Osler 1901). Moynihan, however, when showing his case to the class before operating, mentioned the possibility of its being one of leather-bottle stomach. It would seem, however, that if one had in mind the condition, the diagnosis might be much oftener made. A skiagram of a leather-bottle stomach filled with bismuth would, it seems, often be very significant if not diagnostic, as it was in Moynihan's case.

Filling of the stomach with gas, air or water should be of diagnostic value in many cases. The size, location and direction of a tumor when present might be suggestive. In Lyle's collection of cases a "sausage-shaped tumor or a sense of resistance was reported in 13 cases." Given a case in which sclerosis of the stomach is suspected, a coexisting arteriosclerosis with cardiac trouble would add to the suspicion. A clinical diagnosis between a benign and a malignant leather-bottle stomach is impossible. Indeed, as shown in the earlier part of this paper, it is often necessary to make numerous sections before the question of malignancy can be decided.

Unless relieved by surgical means the disease is invariably fatal. In the present state of our knowledge the conclusion seems warranted that the treatment of this condition should be gastrectomy in all cases in which this operation is at all feasible.

The following case occurred in the writer's practice:

> J. J., aged forty-six, white, male, married, glass worker. Was admitted to Hope Hospital April 11, 1914, having been referred by Dr. Dodds, of Hartford City, to Dr. G. W. McCaskey, who in turn referred the case to me.
>
> Complaint: Stomach trouble. Family history: Father died at sixty-seven of pneumonia. Mother died of lung fever. Three

brothers and three sisters living and well. Paternal uncle had cancer of the nose. Previous history: Always been strong and healthy. Never been ill before. Denies venereal infection. Has eight children living and well. Uses neither alcohol nor tobacco. Has always been a hard worker and light eater. Eats everything but rather irregularly. Keeps his bowels moving regularly daily by taking physic.

Present illness: Began about five weeks ago with pain in left side low down, which seemed to "work up" until now it is localized just under the navel. Patient says he feels as though there were a heavy cake there. Stomach has a gnawing and grinding pain which gets worse about 7 or 8 o'clock P.M. Eats his supper at about 5 o'clock. Noon meal seems to have no influence on the pain. Everything the patient eats seems to sour. He belches a great deal and is troubled with gas. At night when the pain comes on he is nauseated. Has not lost weight. Rests well at night until early morning when he awakes and gets restless. No nocturia. No headache. Has dyspnœa when pain comes on and on exertion.

Physical Examination.—Heart normal except for slight accentuation of the second sound. Large growth in the epigastrium extending down as far as the umbilicus and three inches to the left. The margin of this tumor is very definite to the left and rather indefinite to the right. Tumor is tender on pressure. Very slight and doubtful respiratory movement. The upper border of the tumor extends under left costal margin at about the centre. Urine nomal. Blood: hæmoglobin 75 per cent., white blood-cells 7600, pn. 65, s. 10, L. 1, eosinophil 1. Gastric contents coffee-ground in appearance, much mucus, blood, hydrochloric acid 4 per cent., total 40; Oppler-Boas bacilli and sarcinæ present. Stools contained no mucus nor blood. Diagnosis: Gastric cancer.

Operation (April 16, 1914).—Ether anæsthesia. Through a midline incision, it was found that practically the whole stomach was involved in the tumor. No glandular involvement was discovered. The under surface of liver was adherent to the pyloric end of the stomach over an area about the size of a small palm (it was later found that this area of adhesion corresponded with the ulcerated area on the mucous surface of the stomach). A subtotal gastrectomy was done. After closure of the duodenum a loop of the jejunum was brought up and united to the remains of the stomach with the aid of a Murphy button reinforced by a few Lembert sutures of linen. The Murphy button was used because there was not enough stomach wall left for the gastro-enterostomy by suture unless the union between the stomach and

gut was made in the vertical direction and it was feared that this would produce too much tension. The man was allowed fluids in small quantities on the day following the operation. He made an uninterrupted recovery and was discharged from the hospital May 7 (21 days after operation). The Murphy button was recovered on the sixteenth day. The relief following the operation was pronounced and satisfactory, and the man continued free from symptoms for some time. Later, however, he began to fail and developed a tumor in the epigastric region. He died September 6, having lived six months and ten days after the operation. No autopsy was made.

The accompanying illustration (Fig. 1) shows the extent of the resection. Fig. 2 was made from a photograph of the specimen (preserved in formalin). The pathologic process involved the whole of the stomach except the fundus. The walls of the stomach were universally thickened and firm, and cut almost like cartilage. On the mucous surface were several ulcers in the

FIG. 1.—All that portion of the stomach including the pylorus between the two straight lines was removed. The remaining portion of the stomach after closure served to lengthen the œsophagus, making the anastomosis with the jejunum very easy of accomplishment.

pyloric region, one quite large extending nearly or quite to the peritoneal covering on the anterior wall. It was over this area that the left lobe of the liver was adherent. The capacity of the organ was diminished. Fig. 3 is a photomicrograph of a section of the stomach wall adjacent to the large ulcer, and shows the presence of masses of carcinomatous cells. Fig. 4 is a photomicrograph of a section at the edge of the large ulcer, showing first the transformation of the epithelial cells lining the gland lumina from the benign to the malignant type and, second, the marked surrounding inflammatory infiltration.

The points of particular interest in this case as they appear to me are:

(1) The rapidity of the process. This patient regarded himself as a well man five weeks before the operation, at which time practically the whole stomach was involved, as the illustration shows. He lived

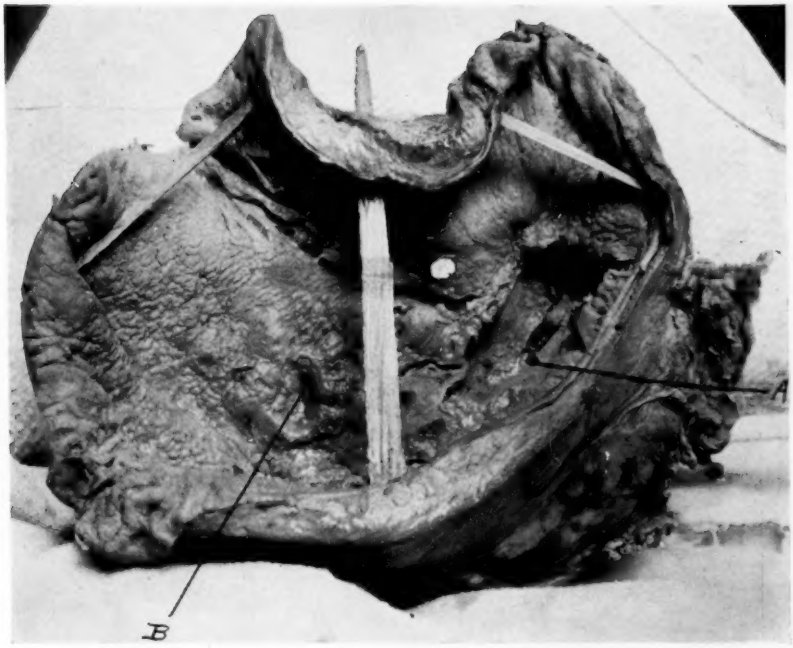

FIG. 2.—Photograph of the specimen after it had been in formalin solution for a number of weeks. Note the great thickening of the stomach walls throughout except near the points of section. There is one large, deeply excavated ulcer at *A*; another ulcer not so large or deep at *B*, and between the two several ulcerated areas. Perforation at the base of the large ulcer was prevented by adhesion to the right lobe of the liver. In the centre of the base may be noted the area from which the tissue was removed for microscopic section. The incision for opening the specimen was made through the posterior wall.

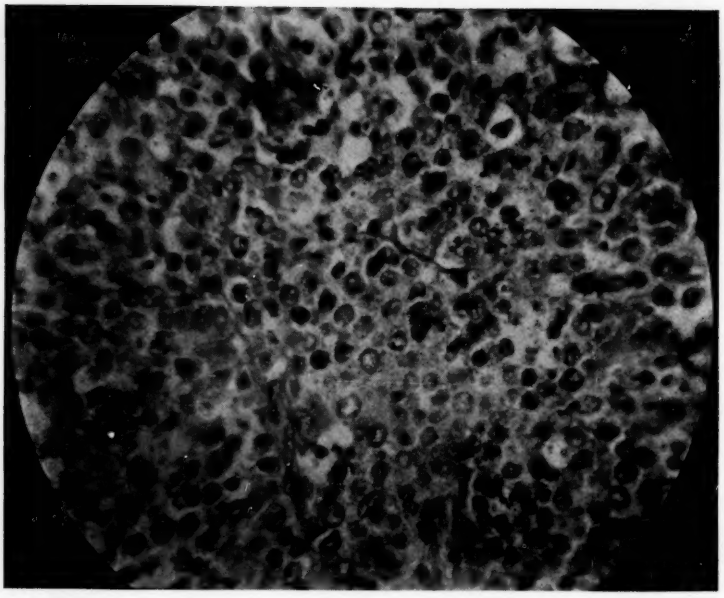

FIG. 3.—Photomicrograph of section of stomach wall adjacent to the large ulcer. Note masses of carcinomatous cells.

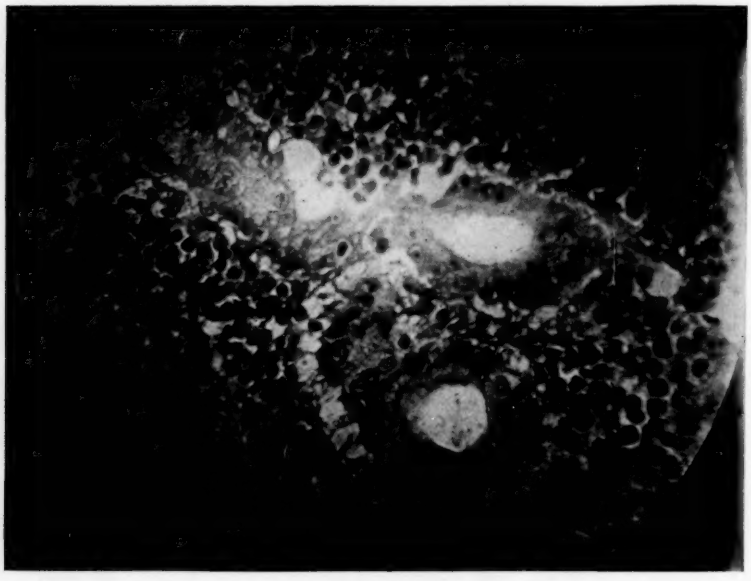

FIG. 4.—Photomicrograph of section from edge of ulcer. Note transformation of cells lining the gland lumina and surrounding inflammatory infiltration.

but seven months and fifteen days from the onset of the symptoms, notwithstanding the complete though temporary relief from the gastrectomy.

(2) The patient suffered some from dyspnœa on exertion and there was some accentuation of the second sound of the heart. There was also some anæmia. These clinical findings are in accord with Krompecher's theory that the stomach changes are due to cardiovascular disease.

(3) The absence of glandular involvement, and the relative absence of adhesions. After the stomach was separated from the liver, which was done without difficulty, the operation was as free from difficulties as could be.

(4) To me the Murphy button seemed admirably adapted to the making of the anastomosis in this case and the result sustains this opinion.

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CANCER OF THE TESTIS*

CONTAINING A REPORT OF 64 CASES, WITH SPECIAL REFERENCE TO 12 CASES OF CANCER OF THE UNDESCENDED TESTIS

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Whether the undescended testicle is more liable to be the seat of malignant disease than the normally descended testicle, is a question that has never been fully settled. The opinion generally held is that the undescended testicle is much more likely to become malignant than the normally descended testicle. The most comprehensive study of this question in recent times is that of Dr. Kenneth Bulkley of New York, on "Malignant Disease of the Testicle Retained Within the Abdominal Cavity" (*Surgery, Gynæcology and Obstetrics,* vol. 17). Literature on this subject is exceedingly meagre.

Blanck's collection in 1906 showed only 19 cases of malignant tumors of the testicle, but Bulkley has collected 57 cases from the literature, and to this he has added 2 hitherto unreported cases from the Presbyterian Hospital of New York, making a total of 59 cases of sarcoma of the abdominal variety of ectopia.

Bulkley states that for years it has seemed to be a surgical superstition that the testicle retained within the abdominal cavity is prone to undergo malignant degeneration. Many of the older writers, Dupuytren, Arnot, Gowers, Lecompte, Godard, and Spry, had called attention to it before Johnson in 1859 put the first case on record. Godard, however, records a very remarkable personal experience, stating that he has observed 8 monorchids suffering from sarcoma, in 7 of which the disease had occurred in the undescended testicle, and in the eighth, in the normally descended testicle. He gives, however, no detailed report of the cases.

Bulkley found no cases reported prior to 1859, and only 57 since that time in the medical literature of France, Germany, Russia, Italy, and the English-speaking races. He attempts to estimate the relative frequency of the condition from the various statistics, and quotes Eccles' analysis of 60,000 male admissions to The London Hospital,

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* Read before the Southern Surgical and Gynæcological Association, December 15, 1914.

showing 38 cases of sarcoma of the testis, of which, one occurred in the undescended testicle.

Howard found in 110,000 male patients admitted to various London hospitals during a period of twenty years, 65 cases of malignant disease of the testis, of which 9 occurred in the ectopic testicle, all of the inguinal variety, and none of the abdominal. Bulkley adds new data derived from a record of 12,729 consecutive male admissions to the Presbyterian Hospital of New York, giving 13 examples of malignant tumor of the testis, of which 11 were situated in the scrotum, and 2 in the abdomen. Combining these statistics we find that of 182,729 male admissions to general hospitals, there were 116 cases of sarcoma of the testicle, of which 12 occurred in the undescended testicle, only 3 of these occurring in the intra-abdominal testicles, or about one in each 60,000 cases.

At the Hospital for Ruptured and Crippled, from 1890–1907, in 59,235 cases of inguinal hernia in the male sex there were found 737 cases of undescended testis, without a single case of sarcoma of the undescended testis. However, it should be noted that the statistics of the Hospital for Ruptured and Crippled, or of any large hernia clinic, do not give a fair estimate of the relative proportion of cases of sarcoma of the undescended testicle, inasmuch as many of these cases, particularly those of abdominal ectopia, will seek relief at some general hospital rather than go to a hospital devoted specially to the treatment of hernia. My own personal statistics throw, perhaps, some further light upon this question. During the past twenty-five years, I have personally observed 65 cases of sarcoma of the testicle. The first 25 of these cases occurred in the normally descended testicle; in the next two cases, however, the disease occurred in the undescended testicle. On going over my entire statistics I find that in 52 cases the disease occurred in the normally descended testicle and in 12 cases, in the undescended testicle.

Different writers give different opinions as to the relative frequency of cancer of the normally descended and mal-descended testes. Shoedel encountered 5 cases of cancer of the inguinal testicle compared with 36 cases of cancer of the normally placed organ; Odiorne and Simmons, in a review of 54 cases of malignant disease of the testicle observed at the Massachusetts General Hospital, found 6 or 11 per cent. in which the disease occurred in the undescended testes; of these, 4 were in the abdominal cavity, and 2 in the inguinal canal. Rademacher gives the proportion of malignant abdominal to malignant inguinal testicle, as 1 to 8. Meiser found 64 malignant inguinal as against 4

abdominal testes. Bulkley, himself, however, found at the Presbyterian Hospital 2 cases of malignant abdominal in 12 cases of malignant inguinal testes. An analysis of these cases encountered by Chevassu, Odiorne and Simmons, and the Presbyterian Hospital records, show the proportion as 1 to 5. My own statistics show almost the same proportion: 12 undescended in a total of 64 cases of sarcoma of the testis, or about 1–5½.

The influence of trauma upon the development of sarcoma of the undescended testicle is less clear than in the case of the normally descended testicle. Bulkley states that only 2 cases of the abdominal type gave a history of direct trauma. He mentions the possibility of trauma from the contraction of the abdominal muscles as a factor in those cases in which the testicle lies at, or near, the internal ring.

As regards the age of development, 42 or a little over 75 per cent. occurred between the ages of twenty-five and forty-five years. This shows that the age of development of sarcoma of the normally descended testicle is practically the same as that of the undescended testicle as shown by Kober, who found that 71 per cent. of 114 cases of scrotal sarcoma of the testis occurred between the ages of 20 and 50 years.

As to the pathology of Bulkley's 59 collected cases,

20 were classed as sarcoma.
10 were classed as round-celled sarcoma.
6 were classed as large round-celled sarcoma.
1 was classed as spindle-celled sarcoma.
1 was classed as mixed sarcoma.
1 was classed as myxosarcoma.
1 was classed as cystic sarcoma.
2 were classed as teratoma.
2 were classed as epithelioma,
2 were classed as chorio-epithelioma.
7 were classed as carcinoma.
1 was classed as rhabdomyoma.
5 were classed as cancer.

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The Clinical Diagnosis of Cancer of the Undescended Testis.—If the testis is in the inguinal canal, or inside or just outside of the ring, it is possible to make a fairly early diagnosis, the signs or symptoms being not unlike those found in connection with sarcoma of the normally descended testicle. If, however, the testis is situated in the abdominal cavity, the diagnosis is rarely made until the disease has reached a fairly advanced stage. Acute abdominal pain is often the

earliest symptom. Usually there is a history of dull, dragging pain in, or over, the iliac fossa. If the trouble is on the right side it is not infrequently mistaken for appendicitis. In several cases I have known operation to have been performed in the belief that the condition was that of appendicitis. After a few weeks—in some cases months—these irregular symptoms are usually followed by the appearance of smooth, ovoid or round tumor in the lower iliac fossa, more or less tender on pressure. In some cases slight fever accompanies the condition; the temperature is usually normal. Sometimes the condition becomes so far advanced before a diagnosis is made, that marked swelling of the leg occurs, accompanied by severe lumbar pain. Bulkley's statistics show 4 cases of strangulation with twisted pedicle to have taken place, in all of which there was an acute onset with abdominal pain, fever, nausea, vomiting, and objective signs of an acute abdominal lesion. In most cases the tumor is fairly well fixed and not very movable.

Furthermore, Bulkley found only 9 cases in which the presence or absence of offspring was definitely noted. Five of these were single cryptorchids, and were fathers of children; four had no children, only one of the latter being a double cryptorchid. Bulkley states that not a single case of double cryptorchid with malignant testicle has as yet been reported as having offspring. This statement will have to be modified since the publication of McGlannon's paper, read before the Southern Surgical and Gynæcological Association, at Atlanta, Ga., December, 1913.

Differential Diagnosis.—The first and most important step in the diagnosis is a careful examination of the scrotum with a view to determining the presence or absence of a normally descended testicle. This, however, has been omitted in many of the recorded cases. Before the disease has advanced sufficiently to form a palpable mass, it may be very difficult to make a diagnosis, as the condition cannot be easily differentiated from that of renal colic, appendicitis, or cæcal tumors. If the testes cannot be found either in the scrotum or inguinal canal, and a tender mass is felt in the lower iliac fossa, giving rise to the symptoms already mentioned, the chances are very strong that one is dealing with a malignant ectopic testicle.

Tuberculosis of the abdominal testis is remarkably rare, as is likewise acute inflammation of the abdominal testicle.

There have been found a few cases of abdominal orchitis of gonorrhœal origin, but no case of syphilitic abdominal orchitis has as yet been reported.

Prognosis.—The prognosis in these cases is exceedingly bad, due

apparently to the fact that an early diagnosis is at present seldom made. In five cases the nature of the condition was not recognized until an autopsy was performed.

The results in Bulkley's 59 collected cases show the gravity of the condition. In 37 cases excision was done, with an operative mortality of 10 per cent. Of the remaining 22 cases, 18 only were traced. Seven cases remained well, but in the majority of these, the interval of time which elapsed between the operation and the date of report is much too short to draw any conclusions as to a permanent cure. Only one patient out of the 37 was well over three years, and but three remained well over two years.

The question of prophylactic treatment is an important one, inasmuch as it may mean the removal of a testis before a malignant growth has occurred. Bulkley believes, that from present statistics we can roughly state that one in every 75 abdominal testes will become malignant. In his opinion, if the individual has one testicle in the scrotum, the abdominal testis should, after puberty, be removed. He states that 37 of the collected cases were single cryptorchids developing malignancy in the abdominal testicle, and that all would have been saved had an abdominal orchidectomy been done before the onset of malignancy, that is, shortly after puberty. In the case of a double abdominal cryptorchid, operation would not be advisable except in the presence of objective signs.

Bulkley's argument is based upon the assumption which he believes to have been proven by statistics, that one in every 75 abdominal testes will become malignant. Personally I do not believe that we have sufficient data at present to warrant us in accepting this estimate. I believe it is much too high. Inasmuch as the condition is usually associated with a hernia, I believe it justifiable to operate, and only in those cases in which it is found impossible to bring the testicle down into the scrotum, would I sacrifice the testicle. My series of cases shows that the trauma incident to the operation of bringing down the testis into the scrotum, may have been the exciting cause of the sarcoma in at least one case.

Bilateral sarcoma of the undescended testes is exceedingly rare. Bulkley's collection of 59 cases shows only two examples, to which has been added one case by Dr. Oliver C. Smith of Hartford, Conn. (*Boston Medical and Surgical Journal*, May 28, 1914, page 839, vol. clxx). A careful search of the literature by Dr. Smith failed to find any other cases.

A brief history of his case is as follows:

Male, aged thirty-eight, farmer, white, married, no children. Both testes absent since birth. Eight years previous, patient had suffered from painful swellings in both inguinal canals, following an attack of mumps. Two months before operation he noticed enlargement in both inguinal canals, followed by rapid growth and considerable pain on one side.

Physical examination, at the time of operation, July 10, 1913, showed both iliac fossæ and inguinal canals occupied by large fluctuant tumors, the right extending from the upper margin of the scrotum to above the umbilical line. The tumor upon the left side occupied the inguinal canal and was less tense. Both testes were absent from the scrotum. Operation revealed an enormous fusiform cyst of the tunica vaginalis, containing 75 c.c. of clear straw-colored fluid. In the upper portion was a hard, irregular mass. The tissues of the cord, including the vessels and lymphatics, were dissected beyond the internal ring; the vas deferens was followed as far down as possible toward the pelvis and removed. A similar operation was performed on the left side, at which time about half the amount of fluid as was found on the right side was removed, together with a malignant testicular tumor. The operation was followed by but little reaction, and primary union resulted. The pathological report made by Dr. John Carter Rowley (pathologist at the Hartford Hospital) read: "Large, round-celled sarcoma of each organ."

Recurrence followed in 8 months and death shortly afterward.

I have another case to add which will be found in my report of cases.

The Duration of Life in Cancer of the Testis (Scrotal Cases).—Cancer of the testis must be looked upon as a particularly malignant type of cancer and the course of the disease is considerably shorter than in most other types. My own series of cases shows that in 48 of the fatal cases in 29 the duration of life was one year or less. In every one of the 6 cases in which it was over three years, the toxins had been used. In one case of five years' duration, it was stated that the tumor had existed four years before operation. In this case it is possible that the tumor was not malignant during the entire period, but a malignant degeneration occurred in an older and originally benign process.

The duration of life in cancer of the undescended testis is worthy of special note, it being much shorter than in the ordinary scrotal type, varying from 3 months to 8 years. In 7 of the 12 cases death occurred within less than one year from the beginning of the first symptom. Only 3 cases lived over 3 years, one 3½, one 6, and one 8 years, and in all of the latter the mixed toxins were used after operation.

Chevassu's statistics show the duration of life in fatal cases to be as follows:

Unknown in	15 cases.
15 days to 1 year	38 cases.
1 to 2 years	17 cases.
2 to 3 years	9 cases.
3 to 4 years	2 cases.

In other words, death occurred before three years in nearly all of the cases, and in 74 per cent. death occurred one year after operation.

Chevassu in an important paper on The Surgical Treatment of Cancers of the Testicle (*Rev. de Chir.*, vol. 41, 1910) has made the first attempt along scientific lines to ascertain the actual results following the surgical treatment of cancer of the testicle. Beginning in 1894 he gradually collected a statistic based only upon tumors of the testicle in which the same histological examination was practised, and in 1908 he published an elaborate paper on Cancer of the Testicle (*Theses de Paris*) in which he reported 85 cases. His later work (*loc. cit. Rev. de Chir.*) contained 100 cases.

Chevassu calls attention to the extremely pessimistic views as to the curability of cancer of the testis, expressed by classical writers, and still held by the great majority of modern surgical authorities, *e.g.:*

Reclus (Duplay and Reclus, 2nd edition, T. vii, 1899), who states that malignant tumors of the testicles are not only fatal, but are so rapidly fatal that one almost always asks the question if operation may not hasten generalization.

Sebileau (Le Dentu et Delbet, T. 10, 1901, p. 241): "Notwithstanding one hastens to perform castration, it seems almost always too late, inasmuch as a recurrence, and an apparently rapid one, uniformly follows."

Arrou (Richard et Rochard, *Chir. de. l'appareil genital de l'homme,* 1901, p. 239): "Castration has never cured an individual suffering from cancer of the testicle."

Monod and Terrillon (*Traité des maladies du testicle,* 1889, p. 619): "Castration does not give any general hope of life to patients operated upon."

Other well-known authorities such as, Paget, Curling, Kocher, Le Dentu, Duplay, Most, Chalot, etc., might be quoted to confirm the same opinion. Chevassu states that they all admit the constancy of recurrence, and, in regard to the few examples of cure that have been published, they regard it is so exceptional as to make it possible to question the exactness of the diagnosis. Pousson (*Gaz. hebd. des Sc. méd. de Bordeaux,* September 12, 1909) expresses an even more pessimistic opinion as to the hopeless prognosis of tumors of the testicle. He states: "Sarcoma may sometimes be cured, but epithelioma, never. For my part, I have never seen a cure. I consider an attempt to remove the abdominal glands as useless. I do not believe that the search for the glands in any way improves the results."

American authorities, *e.g.*, Dr. Bevan (*Keen's System of Surgery*) who expresses the same opinion, and states that he has never seen a cure, no matter how early operations were performed.

Chevassu's statistics, based upon 100 cases, very carefully collected and analyzed, prove that these gloomy views are not in entire accord with the actual facts. The operative prognosis of cancer of the testicle, while still very grave, is not as bad as it has been pictured. Instead of an occasional patient surviving operation, and this being explained as a mistake in the diagnosis,

Chevassu shows that in 100 cases, in which there can be no question as to the diagnosis of malignancy, 19 patients were found alive and well from 4 to 10 years after operation. A study of the histological type of these cases of survival is of great interest. He classes them as follows:

Of 47 cases described as "epithelioma seminal" 16 were cured; that is, well from 4 to 10 years.

Of 50 cases classed as "mixed tumors" only three were cured.

Of the 3 remaining cases classed as "sarcoma" all died.

The more one studies the recent attempts of the pathologists to classify malignant tumors of the testicle into a large number of distinct groups, the more futile seem such attempts, inasmuch as each one of the many types depends upon the histological character and arrangement of the cells, which is differently interpreted by nearly every observer. For example, take the two most recent, and by far most important, contributions to the study of tumors of the testicle, published by Chevassu (*loc. cit.*) and Ewing ("Teratoma of the Testis, and Its Derivatives," *Surgery, Gynæcology, and Obstetrics,* March, 1911).

Ewing believes that practically all cases of malignant tumor of the testicle should be classified as teratomas, or carcinomas derived from teratomas.

Of the 100 cases of Chevassu, he classes only one as a teratoma. He classifies his cases thus; as: 1. Epithelioma seminal or seminoma, 47 cases. 2. Sarcoma (rare), 3 cases. 3. Mixed tumors, 50 cases. As regards his group of so-called "mixed tumors," 50 out of a total of 100, he subdivides them as follows:

(1) Teratomas, or tumors benign.

(2) Tumors properly called "mixed tumors," polymorphomes, or heteromorphomes. These tumors are originally benign, but later assume a tendency to degeneration.

(3) Epitheliomas, sarcomas, placentomes, etc., in which one no longer finds remains or mixed tumors (cartilage, muscles, etc.) but which have absolutely the same structures as certain malignant degeneration of malignant mixed tumors.

In regard to teratomas, Chevassu states that they are usually benign, but susceptible to malignant degeneration. Of 6 teratomas, in which he followed up the after history, only one presented microscopical manifestations of degeneration, and this alone proved fatal.

Ewing in his paper presents a very lucid and exhaustive study of tumors of the testis, particularly bearing upon the etiology of such tumors. He calls attention to the fact that the formerly extensive group of sarcomas has been narrowed by the elimination of many cases of carcinoma which were once regarded as alveolar sarcoma.

Ewing advances the view that practically all malignant tumors of the testicle originate from a pre-existing teratoma, and he takes issue with Chevassu, who believes that his class designated as "seminoma" originate from the epithelial cells of the seminal tubules and are entirely unrelated to teratoma.

I have neither the requisite knowledge, nor is this the proper place to discuss the relative merits of these opposing theories. I wish merely to point out that before entirely accepting Ewing's conclusions much additional evidence must be offered. The most important objection to this theory is, that in a very large number of cases of cancer of the testicle no teratomatous elements are found. Ewing explains the absence of these elements by assuming that a preëxisting teratoma at the time of operation had already been destroyed by the advancing carcinoma. This is a very broad assumption and comes dangerously near "begging the question."

I still consider it the wiser plan to make a separate group of those tumors which show typical histological characteristics of teratoma, as Chevassu and Wilms have done. This group of tumors will be found to present markedly different clinical features from the larger group of tumors, which have been almost universally designated as sarcoma by the older pathologists, but more recently have been classed as carcinoma or mixed tumors. This larger group of cases—exclusive of the teratomas proper—have a very similar clinical history, and in harmony with that of carcinoma tumors rather than sarcoma. Hence, I believe that the old idea of classing them all as sarcoma was probably an error. Like carcinoma, they have a strong tendency to involve the neighboring lymphatic glands, and again, like carcinoma, they are much less strongly influenced by the mixed toxins of erysipelas and bacillus prodigiosus than sarcoma.

Is it not possible to assume that a preëxisting teratoma may play a secondary and minor part in the etiology of malignant tumors of the testis, such as the dermoid cysts play in malignant disease of the ovary, or as chronic mastitis or benign adenomas play in the development of cancer of the breast? They simply offer a point of least resistance or a favorable soil for the development of the disease. No matter what views we may hold as to the etiology of these tumors of the testis, the wide difference of opinion as to their classification, that exists among pathologists at present, furnishes a very good reason for reverting to the old and comprehensive term "cancer," which includes all varieties of malignant tumors. This was evidently the opinion of Chevassu, for he groups all his cases as "cancer of the testicle."

In 1901 (ANNALS OF SURGERY, September, 1901) Dr. B. H. Buxton and I reported before the New York Surgical Society a very typical case of teratoma of the testicle, in which a very careful microscopical study was made by Dr. Buxton. In this report we stated:

"Wilms's paper (*Beiträge zur Pathologischen Anatomie*, Ziegler, Band xix) is undoubtedly the most complete and valuable work we have upon teratoid tumors of the testis, but we must remember that it was written entirely from the point of view of the pathologist.

The material upon which his paper is based comprises ten tumors of the testis observed by himself at the Pathological Institute of Giessen, and which he classes as "*Mischgeschwülste des Hoden*," and fifteen others, classed as dermoid cysts, that he has collected from literature. To show the confusion that has existed up to the present time, and still exists, as to the classification of these tumors, we need only to note that the original microscopical diagnosis in the ten cases which he classes as teratoid tumors was as follows:

The first case was classed as a myxosarcoma;
The second as a cystosarcoma;
The third as a carcinoma;
The fourth, mixed tumor of the testis;
The fifth, carcinoma;
The sixth, medullary carcinoma;
The seventh, cystoma;
The eighth, cystoid disease of the testis;
The ninth, cystosarcoma of the testis;
The tenth, teratoma, with malignant degeneration.

I do not think we should adhere too literally to the view of the pathologist, that these teratoid tumors are non-malignant. In two of Wilms's ten cases the subsequent history proved them to have been malignant, and in several of the remainder the after-history was not traced."

The Prognosis of Cancer of the Testicle.—The prognosis of sarcoma of the undescended testis, as I have already stated, is exceedingly grave. Bulkley's entire series of 57 cases of sarcoma of the testis, shows only one in which the patient remained well over three years. My own series of 11 cases shows two patients living beyond three years.

The nearest approach to a cure has been my case, Dr. B., in which a very extensive tumor was removed by Dr. J. B. Murphy, who sent him to me immediately after he had recovered from the operation, for prophylactic treatment with the toxins. When he reached me there was already marked induration in the iliac fossa and abdominal wall, whether due to a recurrence or an inflammatory condition resulting from the operation, it is impossible to state. At any rate, the induration disappeared under the toxin treatment and the patient remained well for three years, and then died of a probable recurrence in the lung, but it is not entirely certain, as he had been suffering from tuberculosis of the lungs for some time before he developed the sarcoma of the testis.

Of my other cases of cancer of the undescended testis, one of the inguino-superficial type, operated upon by Dr. Howard Lilienthal, and treated by him with the mixed toxins of erysipelas and bacillus prodigiosus, under my direction for several months, is still well six years thereafter.

Until recently few statistics have been available upon which to base any very definite conclusions as to the actual prognosis of sarcoma of the testicle. The most important recent statistics are found in the papers of Kober,[1] Chevassu,[2] and Codman.[3]

Of 114 cases collected by Kober, which were treated by operation, 37 were not traced. Of the remaining 77, 41 died in from a few days to three years. Of these 41 fatal cases, 23, or 56 per cent., died within five months, of metastases. Eleven others died from seven to twelve months after operation, making 83 per cent. of the fatal cases that died within the first twelve months after operation. Two patients lived beyond three years, but died later of recurrence.

The next important statistic is that of Chevassu.

Of 100 cases collected by Chevassu, 19 were living four years after castration. As to the histological type of tumor, in these cured cases, 16 were "epithelioma seminal," a tumor characterized by Chevassu as seminoma. Only three were of the mixed type, ordinarily known as embryonal sarcoma.

A recent and important statistic is that found in a brief report of Codman, who collected 80 cases treated at the Massachusetts General Hospital within the last forty years, 63 having reports of pathological examinations of the specimens removed. Sixteen cases could not be traced. Of the 64 cases traced, 13 were living, 12 died of other causes; of these 10 had been operated upon. Thirty-nine died of the disease, 33 with, 6 without operation, giving a mortality of the disease of 61.9 per cent. Of the 56 cases operated upon, 13 were living —average time after operation 8 years; extremes 2 and 28 years. Ten died of some other trouble—average time after operation, 10 years; extremes 7 months and 26 years. Twenty-three, or 41.07 per cent. of those operated upon, survived the disease. If 8 unoperated and 12 cases operated upon when metastases were evident are excluded, we find that 52.27 per cent. were cured. From this study, Codman concludes that, "the prognosis of sarcoma of the testicle, while bad, is not,

[1] Am. Jour. of Med. Sciences, 1899, vol. 117, p. 35.
[2] Thesis of Paris, 1906; Rev. de Chir., 1910.
[3] Boston Med. and Surg. Jour., February 19, 1914, p. 267.

when operated, so universally bad as text-books would lead us to infer." These statistics going back over a long period include a number of cases in which the diagnosis was not confirmed by microscopical examination and cannot fairly be compared with Chevassu's series or the later statistics of Hinman.

My own series of cases furnishes few data as regards the prognosis of sarcoma of the testis after operation, inasmuch as the great majority of cases were referred to me after a recurrence had taken place and many in a very far advanced and hopeless stage of the disease; only 9 cases were operable when referred to me. On the other hand, the very nature of this series of cases throws further light upon two very important questions:

1. Can anything be done after primary operation to improve the prognosis?

2. Can anything be done with even a remote chance of cure after recurrence has taken place?

The most recent statistical study giving the result of operative treatment of the testicle, is the admirable paper of Hinman, assistant resident surgeon, Johns Hopkins Hospital, read before the meeting of the American Medical Association, June, 1914 (*Jour. A. M. A.*, December 5, 1914).

An analysis of the 32 cases reported is of great interest; 25 were admitted to the Johns Hopkins Hospital, 2 were not treated, and in 7 the operation was performed outside and the specimens sent to the laboratory of Dr. Jos. C. Bloodgood for diagnosis. Seven of the tumors occurred in the undescended testis, which, Hinman states, supports the accepted view that malignancy is relatively more common in men with undescended, than normally descended testes.

The age limits were twenty-four and sixty-seven years; 8 were under thirty.

As regards trauma, it is stated that in 11 cases or 33 per cent. there was a history of some antecedent injury.

The duration of the disease from the time it was first noticed until operation, varied from one month to 20 years. Hinman states that 4 cases of the series in which the patients are still alive, had a pre-operative duration of four months, two years, six years and twenty years. He concludes that the duration gives no clinical indication of the character or degree of malignancy.

He states that the pathologic material was personally examined in 22 of the cases. Parts of all of these showed a picture typical of these testicular tumors and not duplicated by any other tumor, in the presence of characteristic large round cells in a lymphoid or fibrous stroma. In 10 of the cases in addition to these typical areas of carcinoma cells there were found, either alone or in association, areas of cartilage or of cystic, glandular, myxomatous,

fibromuscular or embryonic connective tissues, which he states place them in the group of teratomas. The round cells of the simple-cell tumors were in all cases larger than lymphoid cells, and the round-cell picture in the two types of tumors was absolutely identical. In the majority of the tumors in which cartilage was found it was present in small areas and might easily be overgrown by the more active carcinoma cells, and this may have occurred in these pure-cell tumors. In 6 of the 10 cases in which no material was available for study, a previous microscopic diagnosis of alveolar or round-cell sarcoma has been made. Hinman states that in view of the fact that the previous diagnosis of the 12 pure round-cell tumors and of 3 of the mixed tumors had been some form of sarcoma, it is to be supposed that these 6 cases were either teratomas or a one-sided development of a teratoma. "These findings" he states, "only confirm those of Ewing, namely, that, clinically, all malignant tumors of the testicle are of teratomatous origin."

Hinman states that there were a number of cases with the clinical diagnosis of malignancy in which the removed testicle, on subsequent microscopic examination, proved to be the seat of syphilitic orchitis.

Metastases were clinically present at the time of the operation in four of the patients, all of whom died of carcinomatosis. Seventeen patients had retroperitoneal glandular metastases at death. In 8, death is said to have been due to general carcinomatosis and presumably lumbar metastases were present.

The ultimate result is known in 24 cases, of which 20 are dead and 4 living. Of the 18 cases in which the result is known and the specimens have been examined, 9 are pure round-cell carcinomas and 9 are teratomas. Of the former group two patients are alive, one 12, the other 13 years. None of the seven patients that are dead lived over 2 years. Of the latter group (teratomas) all are dead except one, who is now alive for only 16 months. Hinman believes that this shows the higher malignancy of the mixed type, which is in accord with Chevassu's opinion.

In the 4 cases in which the material was not available for study, one is alive 12 years; the other three died one, two and eight years, respectively, after operation.

In view of the very bad prognosis of the ordinary surgical treatment of cancer of the testicle by removal of the testis and cord, Hinman strongly advocates the radical operation proposed by Chevassu, in most cases, and gives the first complete résumé and analysis of the cases thus far operated upon by the radical method. He has collected 44 attempts at radical removal of the primary pre-aortic lymph area in treating testicular tumors. The fact that over 7 per cent. of the few cases so far reported that have been subjected to the radical method were found on subsequent examination of the specimens to have had syphilitic orchitis, has induced him to advocate doing the operation in two stages: (1) simple castration and thorough histological examination of the tumor; (2) the operation for removing the lumbar glands. The latter is a very extensive operation and is carefully described by Chevassu and Hinman. It is, however, the results of the cases thus far operated upon that chiefly concern us here. Five of the patients died of post-operative complications, three of pneumonia, two of peritonitis, giving an operative mortality of 11 per cent.

With the exception of two cases there was no clinical evidence of lumbar metastases before operation. Of the remaining 42, 20 were living: 9 over 2 years,

the longest 4 years and 10 months; the shortest one month. The average time since operation of the 20 reported alive is one year and 8 months. Sixteen or 41 per cent. have died of cancer, all within one year, except 2.

While the lumbar glands were palpable in only two cases before operation, 22 or over 50 per cent. of the cases showed cancer invasion of the lumbar nodes removed at operation, and in 11 of these the involvement was so extensive as to be inoperable. In 8 of the cases in which the lumbar glands were removed, subsequent microscopic examination showed no cancer invasion. In 3 no lumbar glands were found at operation. All of the 11 patients in whom the glandular involvement was so extensive as to render its complete removal impossible, are dead, except 2 who had been observed for only one month. Of the 14 patients with glandular involvement in which the glandular area was supposed to have been completely removed at operation, 7 are living, one died of pneumonia 7 days after operation and 6 died of a recurrence of the cancer. Of the 8 patients with clean glandular removal, but in which no involvement could be found, 5 are living and 3 died of cancer. Two of the 3 in whom no glands at all were found, are dead. Of the 6 in which no mention is made of glands, 2 are dead, one and twelve months after operation; 3 are living, 1, 12 and 48 months.

Of the 6 patients referred to, who had glandular metastases removed, one, in whom 2 of the glands removed at operation showed marked invasion, is now alive and well almost five years after removal; 3 other patients are alive with no evidence of recurrence for almost 3 years from the time the glands were removed, and 2 other patients were alive after operation, 8 and 1 months, respectively, at the time of the last report.

Among the conclusions reached by Hinman are:

Orchidectomy will cure from 15 to 20 per cent. of teratoma testis. Obviously a cure is possible only when the testicle is removed before the onset of glandular or other metastases.

"The experience of various surgeons in a total of 46 cases has demonstrated in suitable cases the feasibility and technical ease of the radical operation with a combined mortality in all cases of only 11 per cent."

At first sight, the argument in favor of the radical operation so strongly urged by Chevassu and Hinman seems cogent and sound, but after a more careful analysis, several weak points appear. Taking Hinman's own figures, we find that about 50 per cent. of the cases subjected to the radical operation showed no involvement of the glands at all, and hence, 22 patients had to undergo a very grave operation only to find that there was no occasion for it. The next and very important point is, that in 11 cases, or about 25 per cent. of the total number, the glands were found to be so extensively involved that the condition was inoperable. In other words, in 50 per cent. of the cases operated upon, no glands were present; and in 25 per cent., the condition was so far advanced as to make surgical removal impossible; thus, in 75 per cent. of the cases no benefit was offered from the operation.

We find then this very formidable operation with a mortality of 11

per cent. advised as a routine measure in all cases of cancer of the testicle, when it offers no hope of benefit in 75 per cent. of the cases. Therefore, it is clear that the only ground for justifying the operation must be the benefit that it offers in the small group of 25 per cent. of the cases, in which the glands were found at the time of the operation, and it was possible to remove them surgically. In this group we find, out of 14 cases operated upon, 6 died of recurrence, and one died from the operation, leaving seven cases still living at the time of the report.

The duration of life after operation in a few of these cases is insufficient to justify classing them as cures, only 1 was well over 3 years. Therefore, at present we can safely state that we have no data for estimating the number of actual cures. I do not believe the number of lives saved by the radical operation, sufficient to offset the mortality of the operation itself.

Another serious objection to the operation, in my mind, is, that even though no glands are found after a most careful dissection, this does not mean that they are not present, since of eight cases, of Hinman's collection, in which no involvement could be detected after a clean removal of all the glands, three died of cancer. Another most striking fact is, that of the three cases in which no glands could be found, two are now dead from a recurrence.

OPERATION: REMOVAL OF TESTIS AND CORD, FOLLOWED BY PROLONGED TOXIN TREATMENT

I believe that my own series of cases show that cancer of the testis treated by simple orchidectomy, without any appreciable risk, and followed by a thorough course of treatment with the mixed toxins of erysipelas and bacillus prodigiosus (also without risk), have a far better prognosis than those subjected to the very extensive laparotomy with removal of the lumbar glands, as advocated by Chevassu and Hinman.

In comparing my own results with other series of cases of cancer of the testicle, it is important to note that my series represents an entirely different type of cases from the others, inasmuch as in the majority of cases the disease was far advanced at the time when the patients came under my observation. In only 9 the toxins were given immediately after primary operation before recurrence had taken place, and yet in spite of this, 13 patients were well beyond a period of 3 years, and only 2 of these recovered without the use of the toxins; furthermore, both were of the teratoma type, one almost a pure tera-

toma and probably not malignant; the other a teratoma with carcinomatous degeneration.

It is further worthy of note that 2 of the cases of this series were cancer of the undescended testis. In one case the toxins were used after operation and the patient remained well over three years, when he died either of metastases or tuberculosis, probably metastases. In the other, the toxins were used as a prophylactic after operation; the patient is now well, 8 years.

Very few recoveries from sarcoma of the undescended testicle are to be found in the literature.

Dr. Robbins has sent me a more detailed report of his case mentioned in the discussion of Hinman's paper (*Jour. A. M. A.*, December 5, 1914). It is as follows:

Male, age fifty-five years, carpenter. Family history negative; no history of trauma. Patient had some enlargement of the right side of scrotum—whether due to hydrocele, or enlargement of the testis itself, it was impossible to determine for a period of twenty years. He was tapped several times during the year prior to the operation. The last time, bloody fluid was obtained, and a rapid increase in the size of the testis was noticed.

Operation (January 7, 1909).—A large tumor of the testis was removed, the lower part of which was elastic in consistence, and the upper, comparatively hard. The tumor was partly broken down at the time of the operation. Some portion of the healthy testis remained. A rapid, local recurrence followed, and on June 22, fifteen days after the primary operation, a second operation was performed, which consisted in the removal of a large portion of the scrotum on the same side, and the cord as high up as the internal ring, leaving apparently clean normal tissue. One week later (January 28) a well-marked local recurrence appeared, and grew very rapidly. Believing that there was no hope in further operative interference, the patient was put upon the mixed toxins of erysipelas and bacillus prodigiosus, the dose being carried up to the point of producing severe reactions—temperature of 102°–103°. No further growth was noticed, and the recurrent tumor slowly disappeared. The patient was discharged from the hospital on February 15, 1909, and the injections were continued for some weeks longer, twice a week. He remained in good health for four years, when he developed nephritis, which proved fatal. There was at this time no evidence of any return of his old trouble.

Hertel of Copenhagen, Denmark (*Hospitalstidente*, April 7, 1909), in a paper upon "The Treatment of Sarcomata with Coley's Fluid" reports 2 cases of inoperable recurrent sarcoma of the testis treated with the mixed toxins of erysipelas and bacillus prodigiosus. He states that the outcome is highly encouraging for the utilization of these injections in suitable cases. He will feel obliged in the future to employ Coley's fluid in all sarcoma cases which may come under his treatment, even when he feels certain of having removed all sarcomatous tissue in a radical operation.

The first case, male, twenty-nine years of age, upon whom castration had

been done at the hospital in 1904, for sarcoma of testicle. A recurrence was observed a year later in the inguinal glands, which were then extirpated. Two years later there again was an extensive recurrence in the same region and a third operation was advised, although the danger and possible uselessness of such procedure were fully appreciated. Lennander's operation was performed and, in the course of the same, infiltrated glands were seen to extend upwards along the iliac vessels, and some of these had to be left behind as they could not be reached. The expected femoral thrombosis did not occur and the wound healed within a month after operation.

In the hope of perhaps influencing the sarcomatous tissue that had been left behind, Hertel, in January, 1908, began the use of the mixed toxins in doses of from three to twenty cgr. On March 20, the patient was discharged well and at the time of the report, November, 1908, was presented before the Koege Medical Society in good condition, without a trace of recurrence. A recent letter from Dr. Hertel tells me that the patient has remained well now 10 years.

Hertel's second case was that of a man, thirty-nine years of age, in whom, likewise, the testicle had been removed for sarcoma. A few months later there was a large recurrence in the abdomen, which seemed inoperable. The toxins were begun at once with the result that the nodules became softer and more fluctuating, although the size of the abdomen did not diminish. He grew constantly weaker, developed ileus and died. Autopsy showed a single large retroperitoneal cyst. Hertel states, if this diagnosis could have been rendered during life, the cyst might have been emptied through a lumbar puncture and the remaining cyst wall could have perhaps been made to disappear through continued treatment with the toxins. There was no trace of recurrence elsewhere.

These two cases of Hertel's offer very strong evidence of the value of the toxins in recurrent sarcoma of the testis even in the presence of extensive involvement of the retroperitoneal glands.

If results like these found not only in my own series of cases, but confirmed by other observers, can be obtained by the use of the toxins it would seem to be much more rational and logical to advise a thorough course of the toxin treatment as a prophylactic immediately after operation, rather than subject all cases to the very grave operation of extensive dissection of the abdominal glands, especially if such an operation is associated with a mortality of 11 per cent.

Trauma.—My series show a definite history of antecedent trauma in 33 per cent. of the cases. This history was so clear and definite in most instances that it is quite impossible to brush it lightly aside as a mere coincidence, as most writers have done. That antecedent, local trauma is a very definite causative factor in the etiology of malignant tumors of all types and in all localities, must be regarded as a well established fact, and particularly is this true in tumors of the testicle, breast and long bones. For further proof of this theory I would refer

to my paper upon "Injury a Causative Factor in Cancer," ANNALS OF SURGERY, 1912.

Site of Recurrence.—My series of cases show that recurrence took place in the inguinal region in 6 cases; in the other testicle in 2; in the supraclavicular glands in 2, in the tongue in 1, axillary glands 1, lungs 2, retroperitoneal glands in 42.

These cases show that the statement made by some writers that recurrence is practically always found in the abdominal glands, is not strictly true.

As regards the type of cell, my cases show sarcoma in 47, teratoma in 2, carcinoma in 2, melanotic sarcoma in 1, fibrosarcoma in 1, mixed-celled sarcoma in 1, small round-celled sarcoma in 7.

The following is a brief report of patients who have remained well upwards of three years.

CASE I.—Male, forty-four years of age. In 1899, testis was removed at the New York Polyclinic Hospital by Dr. John A. Wyeth. The diagnosis of round-celled sarcoma was confirmed by microscopical examination. One year later the disease recurred in the other testis, and castration was strongly urged by the attending surgeon, but refused by the patient. He was put upon the mixed toxins of erysipelas and bacillus prodigiosus, the treatment being carried out by Dr. W. J. Robinson of Danville, Va. The tumor very quickly disappeared. Eight years later, I personally examined the patient, and found him in good health, with no trace whatever of a recurrence. He was still well, when last traced, thirteen years later.

CASE II.—E. O. T., forty-six years; operated upon February 23, 1906, for a rapidly growing tumor of three months' duration. No history of tuberculosis or specific disease. Pathological report: round-celled sarcoma of extreme malignancy. A personal examination, March 22, 1906, showed a small lump, the size of a hazel-nut, in the groin, with enlargement of the deep iliac glands. The patient was immediately put upon the mixed toxins which were continued, three times a week, for seven months, fairly good reactions being obtained. He is still in good health, at the present time, eight years later.

CASE III.—J. P. N. L., adult; operated upon at the Mayo Clinic in November, 1910, for a sarcoma of the left testicle. Diagnosis confirmed by microscopical examination. The mixed toxins were started shortly after the operation, and continued by the family physician, Dr. Embree of Gayville, S. D., under my direction, for nearly three months. The patient is in good health at present, with no sign of a recurrence, nearly four years later.

CASE IV.—W. M. H., twenty-six years, operated upon February 1, 1906, by Dr. J. E. Simmons of Omaha, Nebraska, for a rapidly growing tumor of three months' duration. Microscopical examination proved the disease to be round-celled sarcoma. The toxins were started by me, and later continued by the family physician for about six months. The patient is at present well, with no sign of a recurrence, eight years later.

CASE V.—S., age forty-three years, operated upon in the summer of 1910,

for a rapidly growing tumor of the left testicle, the clinical history and physical signs of which pointed to sarcoma. This diagnosis was confirmed by a number of prominent surgeons. No evidence of tuberculosis; Wassermann negative. About two months later a recurrence took place in the groin, and a second, apparently incomplete operation was performed in the latter part of August, 1910. One month later, after recovering from the operation, the toxin treatment was started by Dr. Percy Shields of Cincinnati, Ohio, and continued until July, 1911. The largest dose given was ten minims. The patient is in good health at present, four years later.

CASE VI.—The following history was given to me by Dr. Wm. Mabon, superintendent of the Manhattan State Hospital: In 1890, patient was operated upon for a tumor of the testicle, which, on microscopical examination, was pronounced sarcoma. Five years later a growth appeared upon the tongue, and increased in size. Extirpation of the tongue was advised by Dr. Mabon, but the patient's family objected so strongly to such a radical operation, that Dr. Mabon decided to try the mixed toxins before excision. Previous to this a section of the tumor was removed by exploratory operation, and submitted to Dr. Wm. H. Welch of Johns Hopkins, who pronounced the trouble round-celled sarcoma. The patient proved very susceptible to the toxins, severe reactions following relatively small doses. The tumor entirely disappeared under the treatment and, in a letter received from Dr. Mabon, under date of March 5, 1910, he states that he has just heard from the patient's wife, who reports him to be in good health, fifteen years after the treatment was started.

CASE VII.—J. D., aged thirty-two years. Referred to the General Memorial Hospital in December, 1908, for an irreducible scrotal hernia. In addition to a large hernia, we found a large, solid tumor the size of a fist, extending up to, but entirely outside of, the hernial sac. Operation: testis removed, which on microscopical examination by Dr. Ewing, was pronounced carcinoma. The patient returned home three weeks later. I examined him personally, on January 31, 1912, at which time he was in good health with no evidence of a return.

CASE VIII.—S. C., forty-nine years, operated upon, July, 1906, by Dr. Schoonover, of Yonkers, N. Y., who pronounced the disease round-celled sarcoma. Two months later a recurrence took place in the abdomen, followed by enormous swelling of the leg and thigh. The toxins were then begun under my direction, and, almost immediately after, the swelling began to decrease in size. The treatment was continued from December, 1906, to February, 1908, at which time the swelling had almost entirely disappeared. The patient received nearly 200 injections of the toxins. The disease finally recurred, causing death in July, 1909.

CASE IX.—P. G., aged fifty-one years, was first seen in consultation by Dr. Howard Lilienthal, in December, 1908. Operation December, 1908, by Dr. Lilienthal, who found the testicle, about the size of a closed fist, occupying a position in the left groin, directly over the aponeurosis of the external oblique, in other words, an inguino-superficial type of undescended testis. Microscopical examination made by Drs. Mandelbaum, Welch, and Ewing, who pronounced the disease round-celled sarcoma. The tumor was removed to a level with the external ring. Two days later the toxins were begun and carried out by

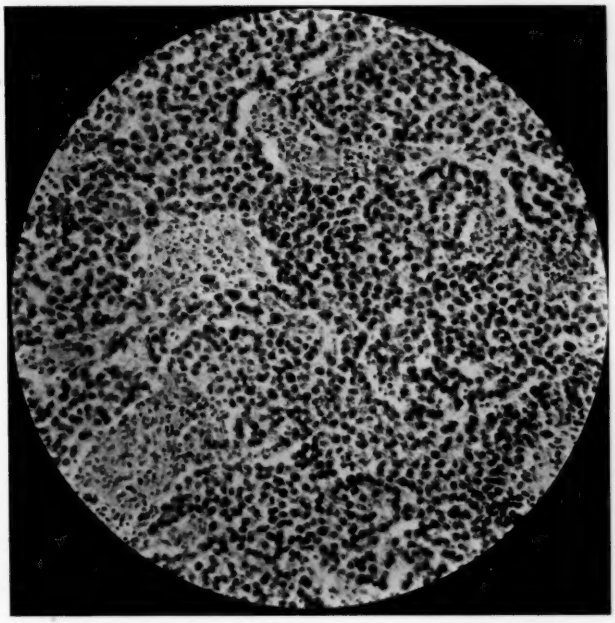

FIG. 1.—Case I. Embryonal carcinoma of testis.

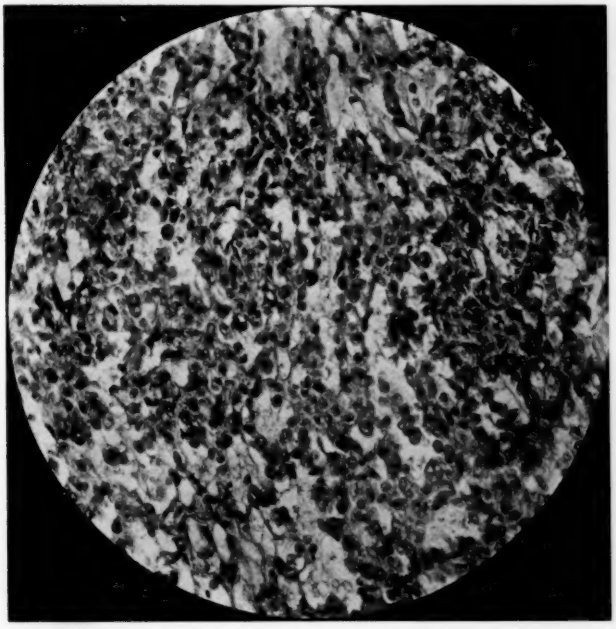

FIG. 2.—Recurrent sarcoma of testis. This section from supraclavicular recurrence.

Dr. Lilienthal under my direction. The patient is now in good health, December, 1914, or six years thereafter.

CASE X.—Dr. D. E. B., aged thirty-seven years. Family history: no syphilis; tuberculosis of lung for past ten years. Two weeks before the first operation, noticed pain in the left hip, together with slight enlargement, and tenderness in the right iliac region, and over the bladder. He consulted Dr. John B. Murphy of Chicago, ten days later, who immediately operated and found a tumor the size of a closed fist. As soon as he recovered, he was sent to me for the toxin treatment (a full history of this case is given below in the list of Undescended Testis cases).

CASE XI.—G. J., aged twenty-seven years; no history of trauma. In April, 1900, first noticed enlargement of the testicle. Operation December 10, 1900, at which time I removed a tumor the size of an orange, which proved to be a typical teratoma of the testicle. A microscopical section had already been reported upon. Patient received the toxin treatment, and when last heard from, three years later, was in good health.

The following is a brief record of my personal cases of cancer of the undescended testicle.

CASE I.—Dr. D. E. B., thirty-seven years; referred to me by Dr. J. B. Murphy of Chicago, on July 8, 1908. The left testis had never been in evidence. No specific history. The patient has suffered from tuberculosis of the lung for ten years. The first symptom was dull pain in the region of the left hip; very severe the second night; it then grew less and disappeared. Shortly afterward he noticed a slight enlargement of the left inguinal and iliac region, extending toward the bladder; slight tenderness on pressure. Ten days after the first symptom, he consulted Dr. John B. Murphy, who operated immediately, and found a tumor the size of a closed fist, completely involving an undescended testis. Microscopical examination proved the tumor to be round-celled sarcoma. As soon as the wound had healed, Dr. Murphy referred the patient to me for the toxin treatment as a prophylactic against recurrence. The entire tumor was sent on and examined by Dr. Jas. Ewing, who confirmed the diagnosis made. The patient was put upon the mixed toxins and proved to be very susceptible, a reaction temperature of 106° following a dose of 3 minims. In December, 1908, the old tubercular trouble became active again and the patient went to Wyoming. The toxins were still continued and gradually his general health became greatly improved; his weight was 170 pounds. He remained in good health without sign of recurrence until the latter part of 1911, when symptoms of abdominal recurrence appeared. He died early in March, 1912.

I think it is fair to assume that the toxins used after operation

played some part in preventing a return of the disease until three years later.

CASE II.—S. B., forty-two years of age; referred to me November 20, 1906; had always had a right undescended testis; no history of trauma. In the spring of 1906 he noticed enlargement of the undescended testis region. Operation was done at the Presbyterian Hospital in June, and the tumor proved to be a sarcoma. A few weeks later numerous tumors appeared in the abdomen, and a second operation was performed in October, by Dr. Wilken of the City Hospital. A vertical incision was made just outside the right rectus, and a tumor, the size of a cocoanut removed. Temporary improvement followed, but a recurrence took place shortly in the shape of a large number of tumors involving the retroperitoneal and mesenteric glands. Physical examination by myself on November 20, showed the patient markedly emaciated and anæmic, and in a desperate condition. The toxins were given for a short time, without apparent effect. Death occurred a few months later.

CASE III.—*Spindle-celled sarcoma primary in the undescended testis, involving mesentery, omentum and lower half of kidney.* S. C., forty-four years; farmer; case of Dr. Maskel Lee, of Wapella, Ill.; no history of trauma. This is another example of abdominal ectopia. The first symptom in this case was pain in the left chest, passing down the left side to the groin. There was slight loss of weight. The first examination by Dr. Lee showed a large tumor, ½ × 7 inches, extending from the left iliac crest to 1½ inches to the right of the umbilicus; firmly fixed; skin not adherent. Temperature 96°, pulse 80; urine highly albuminous; no blood count taken. The patient was sent to a hospital and kept under observation for ten days. The diagnosis of inoperable tumor, probably sarcoma, was made. The patient was then taken to the Rochester Clinic and an exploratory operation was done by Dr. Wm. J. Mayo on March 11, 1913. The abdomen was opened 2 inches to the left of the umbilicus and an immovable tumor was found, starting from an undescended testicle, involving the mesentery, omentum and lower half of left kidney. Microscopical examination proved the tumor a spindle-celled sarcoma. The disease was entirely inoperable and Dr. Mayo advised the mixed toxins. The treatment was begun by Dr. Lee on April 9, under my direction, the doses ranging from ½ to 6 minims, followed by well-marked reactions. After the fifteenth dose, Dr. Lee states:

"There is evidently marked softening with decrease in size and the pain ceased after the sixth injection." After the thirty-

second injection, Dr. Lee writes: "The patient's condition is improved in every way; the tumor has diminished in size, softened and loosened; he sleeps and eats well and has gained some weight."

After the sixtieth injection, Dr. Lee writes:

"It is now a little over six months since the treatment was begun. The tumor is slowly but surely disappearing. It has decreased in size fully one-third. No pain; gain in weight."

The improvement continued until the early part of November, when he began to have obscure pains in various parts of the body and rapidly declined until he died on December 4, evidently of general metastases.

CASE IV.—I. N. R., thirty-five years. This is a further example of abdominal ectopia. No testicle ever noticed on right side. Two years ago, in 1903, he began to have pain in the right inguinal region; he consulted Dr. J. B. Waterman of New York, who thought it might be due to a hernia and ordered a truss. The truss only aggravated the pain and the patient consulted a Chicago surgeon, who made the diagnosis of appendicitis, for which operation was performed on July 24, 1904. An incision was made in the right iliac region and an enlarged testis was found which extended so far toward the median line, that a second incision through the right rectus was made. On microscopical examination the tumor proved to be a teratoma with sarcomatous degeneration. There were no adhesions and the sarcoma part was all within the capsule of the tumor. The patient was referred to me for the toxin treatment, which was begun in September and continued in small doses up to February, 1905, never sufficient to cause any severe reactions. Physical examination January 28, 1905, showed a well-marked induration in the right iliac fossa and a thickening of the scar in the right rectus muscle; the abdomen itself was also somewhat enlarged; his general health was apparently not yet affected. Death occurred within a year.

CASE V.—*Sarcoma of the undescended testis; inguinal ectopia; trauma in early childhood.* P. G., fifty-one years. While playing ball during boyhood, he was struck in the left testicle, which was followed by considerable swelling and inflammation. At this time the testicle retracted into the inguinal region, where it has remained ever since. In 1905 or 1906 he began to have periods of discomfort and pain in the left groin; in the summer of 1907 he noticed enlargement of the testicle which then rapidly increased in size. Operation December 3, 1908, by Dr. Lilienthal, who found the testicle about the size of a closed fist, occupy-

ing a position in the left groin, resting upon the aponeurosis of the external oblique, instead of underneath it, pointing to an inguino-superficial type of maldescent. No communication was found with the abdominal cavity at the operation. The testicle was removed and found to be markedly broken down, resembling very much the caseation of tuberculosis. Microscopical examination made by Drs. Mandlebaum, Welch and Ewing proved it to be *round-celled sarcoma.* After recovery from the operation, I saw the case in consultation with Dr. Lilienthal and advised the toxins as a prophylactic measure. The treatment was given for several months by Dr. Lilienthal and the patient is in good health at present, nearly six years later.

This, I believe, is the only case of sarcoma of the undescended testis on record, well over three years.

CASE VI.—S. W., twenty-nine years. Patient had worn a truss for a year, five years ago; this caused so much pain, that it was left off. He consulted me in August, 1908, and stated that three years ago he suffered from gonorrhœa and prostatitis; the left testicle became swollen shortly after this. Eight months ago he had a second attack of gonorrhœa with inflammation of right and left testicle. He complained of a vague feeling of discomfort and pain six months ago, the pain being localized chiefly in the left loin. One month ago a tumor was first noticed in the pelvic region. Operation by Dr. Charles L. Gibson of St. Luke's Hospital in July, 1913, who found a tumor apparently involving an undescended testis, superficially on the right side, deeply on the left, extending across the whole abdomen and bladder, involving the bladder wall. Microscopical examination showed the tumor to be *carcinoma.* It was the size of two fists and pronounced inoperable.

CASE VII.—A. H., fifty-five years (abdominal ectopia). Referred to me by Dr. Thos. J. Harris, of New York City, on July 9, 1913. Operation had been performed in the early part of 1911, by a New York surgeon, for what was believed to be a hernia. At the operation, however, a large tumor was discovered, evidently malignant, occupying the iliac fossa and lower abdominal cavity. It was regarded as too extensive for complete removal. A portion was excised for microscopical examination, and proved to be sarcoma. An attempt later was made by another surgeon to extirpate the growth, but it was found impossible to remove it entirely. The patient showed temporary improvement for three months, and then began to get worse; pain and hæmaturia recurred. In July, 1913, he was seen in consultation by myself, and the toxins were advised in the hope of bringing temporary

relief. They were given for six weeks in small doses, with little apparent effect. The patient grew rapidly worse, and died a few weeks later.

CASE VIII.—D. T., thirty-one years. Family history negative. Left testis undescended at birth. The patient had noticed enlargement of the left testicle during the year preceding operation, which latter was performed by a prominent surgeon of New York in June, 1909, for a left inguinal hernia and left undescended testis. An attempt was made to bring the latter into the scrotum, but it subsequently retracted into the inguinal region. No other history of injury. In 1910 enlargement of the testicle became apparent and he consulted a surgeon, but was told it was of no significance. There was no pain at any time, although the swelling increased rapidly in size, and the patient lost considerable weight. An operation was performed by Dr. Friend of the Michael Reese Hospital of Chicago in June, 1911. The microscopical examination was made by Dr. W. J. Jobline, from whose report I quote:

> From the presence of cartilage cells and two different definite types of tumor, it is very probable that the original growth was a teratoma undergoing malignant change. It may be called a malignant embryoma.

The patient consulted me in July, 1911, but there was already marked evidence of recurrence with extreme emaciation and general metastases, so that I believed the case too far advanced for the use of the toxins. Death occurred shortly afterward.

CASE IX.—J. R. S., thirty-three years. Family history good. Double undescended testis since childhood. First operation in June, 1905, by Dr. Wyeth, at the New York Polyclinic; both testes were removed for sarcoma. The right was the size of a goose egg, the left $2 \times 3\frac{1}{2}$ inches in diameter. Microscopical examination was made by Dr. Jeffries of the Polyclinic Laboratory. The patient remained well until 1907 when he had an attack of abdominal colic. Similar attacks occurred in 1908–1909; pain and indigestion followed and a general falling off in health. In 1911, he had three severe attacks of colic, in 1912, four. He had very severe pain in the abdomen, which was followed by moderate temperature, 99° to 100°, and great prostration. A mass, the size of a fist, appeared in the retroperitoneal region; this increased in size, and the patient was brought to me by his brother, a surgeon of the South, in May, 1912. Physical examination at this time showed the patient considerably emaciated; a large, apparently inoperable tumor could be palpated in the retroperitoneal region. I started the toxins, but gave a hopeless

prognosis, believing that nothing more than slight temporary retardation could be expected from the treatment. The latter was carried out by his brother who, under date of June 4, 1912, stated that the patient had gained 8 pounds in weight since the treatment was begun, that his color had improved and appetite was splendid and his strength sufficient to enable him to resume his business; there was no perceptible change in the size of the tumor. September 21, 1912, Dr. S. writes "the patient has gained 19 pounds in weight and his general health is splendid. There is a decided decrease in the size of the inguinal glands; the tumor has diminished in size to some extent and feels softer.

The improvement, as I had predicted, proved temporary only. In the early part of 1913, the patient began to get worse and death occurred on January 27, 1913.

CASE X.—B. H., twenty-two years. Possible trauma from previous operation in 1907, done for right undescended testicle and hernia, at another hospital. Testis brought into scrotum; not enlarged at that time. The patient first noticed enlargement in August, 1908. Operation was immediately performed and the testis found to be sarcomatous. The disease quickly recurred and a third operation was performed in October, 1909. The large mass of glands removed from the groin and iliac region also proved to be sarcoma.

CASE XI.—H. W. B., thirty years, was referred to me in December, 1906; the left testicle had never descended; patient never wore a truss. In October, 1903, he began to have pain and swelling in the undescended testis. In March, 1904, the tumor, which had then reached the size of a goose egg, was removed by Dr. J. K. Warren of Worcester; the patient at the time had already lost 20 pounds in weight. About 1½ years later a recurrent tumor, the size of a hen's egg, was noticed in the left groin. The inguinal and iliac glands were also involved. The patient was then referred to me for the toxin treatments, which were used for six weeks in conjunction with the X-ray, without improvement. The patient died a few months later.

CASE XII.—Case of Dr. Geo. H. Walter, Orangeburg, S. C. (abdominal ectopia). Although this case did not come under my personal observation, I was consulted by Dr. Walter in regard to carrying out the treatment. The patient, an adult, had never noticed or felt the left testicle. He had observed a tumor in the left iliac fossa for a number of weeks, causing him continuous pain in the legs and back. The first operation was performed by Dr. A. E. Baker, of Charleston, S. C. A tumor, the size of a cocoanut, partially broken down, was removed. Three weeks

later, a second operation was performed by Dr. Walter, who found a large mass in the left side, just below the umbilicus, with cancerous involvement of the glands of the intestine. I advised the use of the toxins in this case, but in a letter dated August 19, 1913, Dr. Walter stated: "The case had too far advanced when the toxins arrived, the patient died three days later."

This case, I believe, is perhaps the most malignant on record. Dr. Walter stated: "The growth developed with extreme rapidity; in five weeks after the removal of the testicle, the mass which appeared in the left side of the abdomen, opposite the umbilicus, had spread until it involved stomach and pancreas, down to within an inch of the left hip."

CASE XIII.—Since this paper was written, Dr. W. W. Grant of Denver, Colorado, has sent me the history of a very remarkable case of abdominal ectopic testicle. The case had been treated with the toxins for nearly a year, under my direction. The chief point of interest is the fact that when the toxins were begun there was swelling of the legs, and a large inoperable tumor in the abdominal cavity, which became very much smaller under continued treatment. It again increased rapidly in size during a short period of rest from treatment, but as soon as the toxins were renewed it again showed diminution in size, with disappearance of the swelling in the legs.

January 30, 1915, an abdominal incision was made, and the entire tumor was removed without great difficulty. The testicle was plainly observed in the centre of the tumor. Pathological report made by Dr. R. C. Whitman of Denver (a very competent pathologist) stated that it was a typical large, round-celled sarcoma; that is, certain portions showed a typical sarcomatous structure, while others had some appearance of the usual carcinoma,—again emphasizing the difficulty of classifying these tumors. He was again put upon the toxin treatment after operation. (This case will be reported in full by Dr. Grant.)

Note.—A full report of my results in the treatment of inoperable sarcoma in general by the mixed toxins of erysipelas and bacillus prodigiosus, including 124 cases successfully treated by other surgeons, may be found in the Transactions of the Third International Cancer Research Conference, Brussels, 1913.

SARCOMA OF TESTIS.

No.	Age.	Date.	Side.	Antecedent trauma.	Duration.	Testes normal or ectopic.	Type of tumor.	Treatment.	Result.	Final Remarks.
1	26	1906	R.	Yes. Bruise; swelling at once; subsided; returned 3–4 weeks.	Noticed 3 months before operation.	Scrotal.	Sarcoma.	Removal Jan., 1909; mixed toxins (Coley) after operation.	Well 1914, 8 years later.	
2	34	1909	L.	No.	3 months before operation.	Scrotal.	Sarcoma.	Removal Jan., 1909.	Recurred in retroperitoneal region in 6 months.	Death Nov. 30, 1909; total duration of life, 1 year.
3	21	1913	R.	No.	1 month before operation.	Scrotal.	Sarcoma.	Removal Dec. 12, 1913, by Dr. Homer Gage.	Jan., 1913, internal metastasis; rapid decline; toxins for 2 weeks; small doses, but condition so bad, given up.	Died July, 1913; total duration of life, 8 months.
4	25	1912	L.	Yes. Squeezing; injury soon after.	1 year.	Scrotal.	Fibrosarcoma.	Removed in 1910 by Dr. Geo. Ben Johnston.	Recurred in abdomen 2 years later; large abdominal tumor; cachexia, April 10, 1912.	
5	32	1908	L.	No.	?	Scrotal, associated with large hernia not known until hernia operation.	Carcinoma.	Operation, Dec., 1908, W. B. Coley.	In good health Jan. 3, 1912; personal examination.	
6	42	1907	R.	No.	3 months.	Scrotal.	Sarcoma.	Operation Nov. 22, 1907, Dr. Porter, of Boston.	Toxins begun Dec. 10, 1907.	?
7	37	1909	R.	No.	? 5 weeks.	Scrotal.	Sarcoma.	Operation Oct., 1909, by Dr. H. H. Young.	Recurrence in abdomen, 4 months.	Toxins after; large recurrence; little effect; died.
8	42	1901	R.	Yes. 8 months; strain.	8 months.	Scrotal.	Sarcoma; clinical diagnosis.			
9	42	1908	R.	Yes. Horseback at once.	10 months.	Scrotal.	Clinical diagnosis with inoperable metastasis; testes typically sarcomatous.	Case hopelessly inoperable when seen.	No treatment.	Died few weeks later.

10	38	1907	L.	No.	13 months.	Scrotal, size of fist.	Sarcoma.	Operation by Dr. Syms, of Chicago.	2 months later recurred in abdomen.	Oct. 5, 1907, mass size of 2 fists in hypochondriac region.
11	Ad.	1892	R.	No.	?	Scrotal.	Sarcoma.	Operation: removal of testis.	Recurred in tongue 5 years later; large tumor; excision of tongue advised by Dr. Wm. Mabon.	Mixed toxins (Coley) given; severe reactions. Entire disappearance; well 15 yrs.; microscopic examination by Dr. Wm. H. Welch.
12	47	1906	R.	No.	3 years.	Scrotal.	Sarcoma.	Operation, 1906; removal of testis.	July, 1906 recurrence; right groin and iliac fossa with infiltration of all neighboring tissues; mixed toxins; marked temporary improvement.	Died.
13	48	1910	L.	No.	Few months.	Scrotal.	Sarcoma.	Operation Sept., 1909.	Recurrence in abdomen few weeks; retroperitoneal glands in six months; treated with mixed toxins; tumor apparently disappeared.	Lost sight of; probable recurrence.
14	55	1902	R.	No.	2 years; painless swelling.	Scrotal.	Round-celled sarcoma.	Operation July 24, 1902.	Recurred in 2 months; local and in groin; second operation.	Rapid recurrence; toxins; slight temporary improvement.
15	46	1906	L.	No.	4 months.	Scrotal.	Round-celled sarcoma.	Operation Feb. 23, 1906.	1 month later apparent recurrence in groin and iliac gland.	Put on mixed toxins; swellings disappeared; patient well May, 1914, 8 years.
16	?	1912	R.	No.	4 months.	Scrotal.	Sarcoma (microscopic examination) Mayo's.	Removal, Feb. 6, 1912.	Toxins after operation under my direction.	Well Dec., 1914, nearly 3 years.
17	37	1908	R.	No.	4 months.	Scrotal.	Sarcoma (microscopic examination).	Operation April, 1907, by Dr. E. Eliot; recurred in 10 months, in abdomen; very extensive, with marked emaciation.	Death shortly after.	

SARCOMA OF TESTIS.

No.	Age.	Date.	Side.	Antecedent trauma.	Duration.	Testes normal or ectopic.	Type of tumor.	Treatment.	Result.	Final Remarks.
18	46	1904	R.	Yes. Injury to right testis; fall on fence rail in childhood.	Slow increase in size 7 years; 4 years tapped and bloody fluid drained off.	Scrotal.	Sarcoma.	Operation, Nov., 1903, by Dr. Lister, of Chillicothe, Ohio.	Recurrence in abdomen 2 months after.	Death within a year.
19	32	1900	R.	No.	5 months; painless lump.	Scrotal.	Sarcoma.	Operation, Nov. 15, 1899, by Dr. B. L. Bangs.	Recurrence in abdomen in 6 weeks; very great pain.	Death in few months.
20	29	1897	L.	Yes. Fall from bicycle Aug., 1896; injured left testis; tumor 2 to 3 weeks after injury.	3 months.	Scrotal.	Sarcoma, melanotic.	First operation by Dr. Millbrook of Albany; 3 operations for recurrence in 9 months. Fourth operation by Dr. Coley September, 1897.	Rapid recurrence; toxins 3 to 4 weeks; no effect.	Death in 3 months.
21	32	1912	L.	Yes. Fell on fence 18 years ago; swelling, which disappeared.	3 months; no pain or tenderness.	Scrotal.	Sarcoma, small round-celled.	Operation, Oct. 7, 1912, by Dr. Kimball.	Toxins after operation.	Well July, 1914.
22	26	1908	R.	No.	6 to 7 months; painless enlargement.	Scrotal.	Sarcoma.	D. W. Wood, Nov., 1907.	Recurrence in abdomen 5 months.	Death.
23	42	1904	R.	Yes. Injury to left testis getting out of bath tub, April, 1903. Swelling noticed 3 months later.	4 months.	Scrotal.	Teratoma	First operation, by Dr. Chetwood, Oct. 8, 1903; recurred Jan. 1, 1904. Second operation Jan. 28, 1904, by Dr. Coley.	Toxins for 2 months; little effect.	Died Oct., 1904.
24	28	1899	R.	Yes. Fall from bicycle; injured right testis.	1 year.	Scrotal.	Sarcoma, microscopic examination.	Operation, Dec., 1898, by Sir Alfred Fripp.	Recurrence in abdomen 3 months later.	Mixed toxins 6 months; slight but temporary improvement; death in 1 year.

25	28	1911	L.	Yes. Struck with baseball; severe pain 4 days; tumor 8 weeks.	5 months.	Scrotal.	Sarcoma. Mayo's laboratory.	Operation, Dec. 2, 1910, Mayo's clinic.	Toxins after operation for 1 year.	In good health 1 year later.
26	32	1910	L.	No.	6 months.	Scrotal.	Sarcoma.	Operation, July, 1910.	Symptoms of abdominal recurrence 2 to 3 weeks after operation.	Sept., 1910, very large abdominal tumor; size of child's head; toxins given; little effect; died Oct. 10, 1910.
27	49	1907	L.	Yes. Fell astride board 14 years before; injured left testicle.	2 years.	Scrotal.	Sarcoma.	Operation, July, 1906, by Dr. Schoonover.	Recurrence in abdomen and iliac fossa in 2 months; enormous swelling of leg and thigh; toxins given.	Almost complete disappearance of tumor and swelling; toxins given from Dec., 1906 to March, 1908, when tumor had apparently disappeared; recurrence and death July, 1909.
28	33	1895	L.	No.	2 months.	Scrotal.	Sarcoma.	Operation, Mar., 1893, by Dr. A. T. Cabot.	Recurred in abdomen 2 years later.	Toxins, 2 weeks, no effect; death shortly after.
29	28	1906	L.	Yes. Injured testis riding 6 years before.	3 months.	Scrotal.	Sarcoma.	Operation, May, 1906, by Dr. Torek.	Recurrence local; 2 months; second operation.	Metastasis supraclavicular and abdominal glands; 2 doses of toxins ♏½; no reaction; died 3 days later. probably embolism.
30	Ad.	1906	R.	?	?	Scrotal.	Sarcoma.	Operation, Oct., 1904, by Dr. Chas. Stewart.	Recurrence in abdomen 1 year later.	Jan., 1906, toxins ♏ 1 to 15 caused cessation of pain & growth checked; death.
31	31	1904	R.	Yes. Kicked in right testis; enlargement noticed 2 years later.	5½ years.	Scrotal.	Sarcoma.	Operation, Nov., 1906; metastasis in abdomen before testis removed.	Rapid loss in flesh and strength.	Died shortly after.
32	22	1911	L.	No. Gonorrhœa 6 months before.	2 months.	Scrotal.	Sarcoma, mixed-celled.	Exploratory laparotomy, July, 1911; removal of some retroperitoneal glands by Dr. A. A. Berg.	Aug. 29, 1911, left testis size of 2 fists; large tumor in abdomen.	Death.

SARCOMA OF TESTIS.

No.	Age.	Date.	Side.	Antecedent trauma.	Duration.	Testes normal or ectopic.	Type of tumor.	Treatment.	Result.	Final Remarks.
33	22	1897	L.	Yes. Fell from bicycle and injured left testicle; enlargement soon after.	Few months.	Scrotal.	Sarcoma.	Operation, Aug., 1896, Lenhardt.	Local recurrence 6 months. Second operation, June, 1897.	Abdominal recurrence soon; death Oct., 1897.
34	28	1901	?	No.	2 years; painless enlargement.	Scrotal.	Sarcoma.	First operation Dec., 1899, by Dr. DeGomo; recurrence 9 months in glands, in groin, and in abdomen.	Rapid decline.	Death.
35	38	1900	L.	No.	4 years.	Scrotal.	Sarcoma.	Operation, July, 1899; recurrence in abdomen.	1 year later; severe lumbar pain.	Swelling in left leg; toxins marked; improvement temporary.
36	32	1902	L.	No.	22 years; increase in size only 8 months	Scrotal.	Sarcoma.	Operation, April 2, 1902, by Dr. Coley.	?	
37	27	1900	R.	No.	9 months.	Scrotal.	Teratoma.	Operation, Dec. 12, 1900, by Dr. Coley.	Patient in good health 3 years later.	
38	?	1898	R.	Yes. Kicked in right testis by horse 2 years ago; small tumor. Second injury 4 mos. ago.	4 months.	Scrotal.	Sarcoma, round-celled.	Operation, Aug. 11, 1898.	Recurred in abdomen.	Death in 1 year.
39	35	1910	R.	No.	1 year.	Scrotal.	Sarcoma, round-celled.	Operation, May 3, 1910.	Recurred in abdomen; toxins for several months.	Death in 1 year after operation.
40	30	1906	R.	Yes. 15 years ago fell and injured right testis; 10 yrs. ago second injury.	1 year.	Scrotal.	Sarcoma.	Operation, Aug., 1906, by Dr. Deaver.	Recurred in abdomen in 6 months.	Death.
41	22	1909	R.	Yes.	6 months.	Scrotal.	Sarcoma.	No operation; hopeless when first seen.	Recurred in retroperitoneal glands.	Died a few months later; duration of life less than 1 year.
42	24	1904	R.	Yes. Blow Dec., 1901; swelling at once.	9 months.	Scrotal.	Sarcoma.	Operation, Aug., 1902.	Recurred 6 months axillary glands, ribs and lung.	Died July 25, 1903.

43	35	1914	?	No.	6 months.	Scrotal.	Sarcoma.	Operation, 1910; by Dr. Johnston, of Richmond.	Recurred 2½ years later in abdomen and supraclavicular glands.	May, 1914, inoperable; toxins tried; marked improvement.
44	32	1906	?	No.	3 years, then sudden increase in size.	Scrotal size of grape-fruit.	Sarcoma.	Operation, Jan., 1906.		
45	23	1907	R.	No. First noticed March, 1906.	2 months.	Scrotal.	Sarcoma.	Operation, June, 1906, by Dr. J. Stanley Brown.	Recurred in 8 months in retroperitoneal glands; toxins short while; no effect.	Death 11 months later, March, 1908; total duration of life, 2 years.
46	19	1896	L.	No.	1 year.	Scrotal.	Sarcoma.	Operation, Jan., 1896, by Dr. Chas. McBurney.	Large mass in iliac fossa at time of removal of testis.	Grew rapidly worse; death 2 months later.
47	Ad.	1910	L.	?	?	Scrotal.	Sarcoma.	Operation, Nov. 5, 1910 (Mayo's clinic).	Toxins begun under my direction; Dec., 1910, as prophylactic.	Patient in good health over 3 years.
48	45	1913	L.	No	Noticed first early 1910; 6 months before operation.	Scrotal.	Sarcoma, small round-celled.	Operation, Jan., 1911, by Dr. Williams.	Recurrence in 1912, in abdomen; toxins begun Sept., 1912; small doses ⅛ to ½ minim.	Third operation Feb. 31, 1913, abdominal operation; found large inoperable retroperitoneal tumors; not traced.
49	48	1908	L.	Yes. Horseback injury July, 1907; swelling at once.	No operation; loss, 50 lbs. weight 1 year later.	Scrotal.	Sarcoma.	No operation.	Had large inoperable metastasis in abdomen when first consulted surgeon; no glands in groin.	Toxins short time little effect; death 1½ years from first symptoms.
50	28	1910	L.	No.	July, 1910, first noticed; in 3 months size of fist.	Scrotal.	Sarcoma.	Operation, Sept. 23, 1910, by Dr. Donovan, Lewiston, Md.	Dec., 1910, recurrence in groin and retroperitoneal glands.	Mixed toxins begun Dec. 16, 1910, Dr. Coley. Marked improvement: May 1, 1911; still improving.
51	28	1914	L.	No.	Tumor 2 months before operation; no pain.	Scrotal.	Mixed-celled sarcoma.	First operation, Dec., 1912.	Well 2 years, then recurs in supraclavicular glands and lung; no involvement of abdominal glands.	Removal of glands by operation; fulguration; mixed toxins; still under treatment.
52	52	1914	R.	No.	Noticed 1 month before operation.	Scrotal.	Round-celled sarcoma.	Operation, Feb., 1914.	Abdominal recurrence 3 months later; very large abdominal tumors, Nov., 1914.	Mixed toxins Nov., 1914, 2 months marked improvement; temporary metastasis in lung.

SARCOMA OF UNDESCENDED TESTIS

No.	Age.	Date.	Side.	Antecedent trauma.	Duration.	Testes normal or ectopic.	Type of tumor.	Treatment.	Result.	Final Remarks.
53	37	1908	L.	No. Tuberculosis left lung 10 years.	Operation, 10 days after first symptoms (pain).	Abdominal ectopia.	Round-celled sarcoma.	Operation, June 11, 1908, by Dr. John B. Murphy; size of fist.	Toxins begun July 8, 1908, by Dr. Coley; continued at home.	Well over 3 years, then died of recurrence; duration of life, 3½ years.
54	42	1906	R.	No.	Operation 2 months after first noted, June, 1906.	Abdominal. ?	?	Presbyterian hospital, N. Y.	Few weeks later multiple recurrence in abdomen; Nov., 1906, markedly emaciated and cachectic.	Death few weeks later; duration of disease 9 months.
55	30	1903	R.	No. (No truss.)	Operation 6 months after first symptoms.	Inguinal canal.	?	Operation, Mar., 1904, by Dr. J. K. Warren, Worcester.	Recurrence in groin 1½ years later; also in iliac glands.	Toxins 6 weeks and X-rays; no improvement; death Feb., 1907.
56	22	1908	R.	Yes. Possible trauma operation undescended testis and hernia 1 year before.	First noticed Aug., 1908; operation at once.	Inguinal.	Operation, 1908.	Recurred in few weeks in groin and iliac fossa.	Third operation.	Death in less than a year.
57	33	1912	D.	No.	Operation, June, 1905.	Abdominal; double.	Round-celled sarcoma.	Both testes removed by Dr. Wyeth, June, 1905.	Well 2 years, then attack of abdominal colic; recurrence.	Toxins begun May, 1912. Marked improvement continued 6 months. Died January 27, 1913.
58	31	1911	L.	Yes. Operation for undescended testis and hernia year before.	Tumor 2 to 3 months before operation.	Inguinal.	Teratoma type.	Operation, June, 1911, Dr. Friend (Chicago).	July, 1911, 1 month later; abdominal recurrence; extreme emaciation.	Death few weeks later. Duration of disease less than 6 months.
59	55	1913	R.	No trauma.	Inoperable when discovered.	Abdominal.	Sarcoma.	Exploratory laparotomy, Feb., 1911.	Second operation; partial removal; hæmaturia.	Rapid growth; toxins, July, 1913, 6 weeks; no effect; death few weeks later.
60	29	1908	L.	Had worn truss 5 years ago; gonorrhœa 8 months before.	Tumor noticed 1 month before operation.	Inguinal.	Carcinoma.	Exploratory operation July, 1908, by Dr. C. L. Gibson.	Tumor found inoperable; bladder involved.	Death shortly after.

61	51	1908	L.	Injury in childhood.	Tumor 1 year before operation.	Inguinal; size of closed fist.	Sarcoma, round-celled.	Operation, Dec. 3, 1908, by Dr. Lilienthal.	Toxins, 3 to 4 months as prophylactic.	Patient well July, 1914, 6 years later.
62	35	1903	R.	No injury.	Supposed to be appendicitis.	Abdominal.	Teratoma with sarcomatous degeneration.	Operation, July 28, 1904.	Toxins begun 2 months after operation as prophylactic continued 4 months.	Abdominal recurrence 4 months after operation.
63	44	1913	L.	No.	Clinical diagnosis; inoperable tumor of abdomen.	Abdominal.	Spindle-celled sarcoma.	Exploratory operation, March, 1913; large inoperable tumor of undescended testis.	Mesentery, omentum, left kidney involved.	Toxins 6 months, marked decrease in size; ½ increase in weight; Nov., 1913, worse: death Dec. 4, 1913.
64	Ad.	1913	L.	No. Never fell.	Inoperable tumor.	Abdominal.		First operation, July, 1913; tumor size of cocoanut removed; 3 weeks later second operation.	Impossible to remove tumor at second operation.	Extremely rapid growth; entire course of disease less than 3 months.

PERIENTERITIS MEMBRANOSA*

A FURTHER CONTRIBUTION TO THE SUBJECT OF PERICOLITIS, JACKSON'S VEIL, ETC., IN THE LIGHT OF A POST-MORTEM OBSERVATION

By Arpad G. Gerster, M.D.
of New York

American periodical literature of the year 1914 has put us in possession of copious and valuable material bearing upon the question of the situs and significance of the various bands, normal, exceptional and abnormal, that we find associated with the abdominal viscera, notably the intestine.

Perhaps, under the stimulus of Lane's publications, Binnie was the first American surgeon to occupy himself, in 1905, with the subject. Jackson was the first one to study the anatomical structure of the membranes found so frequently about the cæcum and ascending colon. After these there followed a long succession of articles from various authors which, though divergent about the interpretation of the formation and significance of these structures, and perhaps just on account of their divergences, threw much desired light upon the matter. It is not my intention to present an exhaustive synopsis of the literature, my object being rather to throw a new and significant sidelight upon the causation of the band-like formations. R. Bland Williams [1] gives us a very comprehensive summary of the various views held regarding the subject:

(1) Lane explains the presence of the normal and abnormal bands that appear in the vicinity of the ileocolic junction and elsewhere by the factor of *traction* exercised by the weight of the intestine in the upright posture upon the suspensory structures. If traction be really a physiological stimulus,—a question that has so far not been approached from the experimental side,—then why do we find a rich variety of membranes in the fœtus, in whose case the upright posture can certainly not be urged as a serious circumstance? [2] How can we explain by this theory such facts, as that observed by Bevan, quoted by Eastman and Cole,[3] who having removed the appendix of a patient, and having

* Read before the New York Surgical Society, February 24, 1915.

[1] Pericolic Membranes and Lane's Kink. Annals of Surgery, January, 1914, p. 28.

[2] Eisendrath and Schnorr: The Significance of the Jackson Veil. Annals of Surgery, November, 1914, p. 22.

[3] Cole: Annals of Surgery, January, 1914, p. 41.

then carefully noted the absence of any membranes about the cæcum, was compelled to reopen the belly of the same patient a year later, when he found a well developed system of membranes where there had none been before? And the reverse of this has been seen, too, and repeatedly. The sketch herewith presented was made by myself in the post-mortem room of the Mt. Sinai Hospital on December 30, 1913, during autopsy done on a female patient (Eva. R.) who had died of heart failure three days after a smooth and rapid pylorectomy done for carcinoma. The remote cause of death was hypoplasia of the heart and of the entire arterial system. She was a woman of normal stature, externally well developed, but her heart and aorta were no larger than those of a child of nine or ten years. In examining her cæcum and ascending colon we found on the outer side of the gut four very delicate, bloodless and silky white bands, attached on the outside to the parietal peritoneum, on their inner end to the gut on or beyond the tænia, one of them being severed in about its middle, the two ends of the severed bands representing very slender and sharply pointed extremities. Evidently we saw here the last phase of the atrophy and disappearance of a fan-shaped pericolic membrane, that, had the patient lived longer, would have completely disappeared. The evolutionary factor of Lane's theory is absolutely confuted by such a finding as this was, as no permanently formed ligament has ever been seen to disappear. The woman had been a busy housekeeper up to her entry into the hospital, the element of traction had been all the while present, and yet her Jackson's veil was disappearing. Normal structures of considerable bulk may and do sometimes disappear by disuse and atrophy; but this consideration would be utterly inapplicable in this case. Rather may we assume that, originally the membrane had been formed under a stimulus persisting for a while; that this irritant condition having disappeared, the effects of the irritation were about to disappear also. *"Cessante causa, cessat effectus."*

(2) Mayo and Cheevers, and Flint of New Haven, assume that most, if not all, of these structures are of congenital origin. I think that this stand-point cannot be successfully maintained in this absolute form. The congenital factor is an important one, and on its presence is based the formation of the entire suspensory apparatus of all the viscera. Certain folds persist normally; they become the suspensory ligaments such as, for instance, support the hepatic and splenic flexures. But to declare that all membraniform or solid bands found about the gut represent forms of arrested development is too dogmatic. It is flatly and successfully contradicted by one good observation such as

that of Bevan's cited before, or mine depicted in the sketch shown to you. What part is played by congenital bands in the pathological process here considered we shall inquire into in a subsequent paragraph.

(3) The third theory by which we may attempt to explain the process of the formation of these bands and membranes, is the oldest one: It originated with Virchow, and has been maintained in America by the diligent work of Pilcher, by myself and by several other observers. It considers inflammation, due to bacterial action, direct by invasion of tissues, or chemical through absorption of biochemical bacterial products, to be the essential factor. Let us see whether the element of infection, or, as Adami puts it, "subinfection," is capable of yielding a consistent and harmonious explanation of all the known facts pertaining to the subject.

First of all, the character of the process is essentially a chronic one. True that we are frequently enough called upon to interfere on account of acute symptoms of obstruction, or because of the presence of a destructive process involving the wall of the gut. Ulcerative perforations or gangrene of the gut wall occur not only in the appendix; they may and do involve any portion of the large intestine, though for anatomical reasons they are more frequent in the blind sac of the appendix than elsewhere. These acute crises, however, if looked into closely and critically, will all be found to be only the last phase of a chronic process that, judged by well-known, palpable, often gross changes in the affected structures, demonstrate to the pathologist beyond any doubt a preëxistent disorder of a shorter or longer duration.

When, in 1911, I presented my observations on this matter to the American Surgical Association at its Denver meeting, I laid stress upon a comprehensive and unitarian view of this entire question. It is not a question of local, mechanical difficulty alone, though finally the mechanical disturbance brings matters to a head, as it were, compelling the attention of both patient and medical attendant.

The first fact, well established by numerous observations, is this, that membraniform "adhesions" were and are being observed not only in the cæcal area, but may be found near any focus of acute, but especially of chronic infection. It makes no difference whether the seat of the infection is the intestinal or the genital tract. All surgeons, especially gynæcologists, are familiar with the membranous "pseudo-peritoneal" structures that in the presence of purulent oöphoritis and salpingitis envelop the uterus and especially the adnexa, and in the more advanced stages of adnexal disease lumped under the name of "pelvic peritonitis." In these cases I have repeatedly found all the pelvic

contents, including the fundus of the bladder, sealed up, as it were, in the bottom of the pelvis, under a vascular, translucent membrane comparable to a diaphragm. "Cobwebs in the attic of the peritoneal cavity" is more than a picturesque phrase coined by the genial Morris. It actually corresponds to a multitude of forms and variations of new-formed "adhesions" found about and connecting stomach, pylorus, duodenum, gall-bladder, the left lobe of the liver and the transverse colon.

The indiscriminate use of the word "adhesion" has led to and still is maintaining a great deal of avoidable confusion. There are two kinds of adhesions: One kind is what represents truly and literally the immediate and direct adhesion of an organ to another organ, face to face, surface to surface, without the interposition of a membranous or band-like mass of tissue, such, for instance, as we see in the direct adherence of two coils of gut. They occur where the visceral peritoneum was destroyed or damaged, either mechanically, by the surgeon for instance, or histologically by infection. No Jackson's veil is found in these cases, where the adherent surfaces cannot be separated by the most skilful and cautious surgeon without penetrating into the lumen of one or both of the adherent hollow tubes. It is a curious fact, however, that even these close and intimate real adhesions may disappear in course of time, and under favorable conditions spontaneous liberation of the adherent coils may ensue. Two factors come into play here—one is the elimination of the causal infectious element, the second factor depends upon whether any, and if so how much, of the peritoneal coating of the adherent organs was preserved in its structural integrity. Where all the peritoneum included in the area of adhesion was destroyed, there the adhesion is bound to remain permanent. Where, on the other hand, most of the peritoneal tissues embraced in the adhesion have been preserved, there we find, provided that the causal infection be eliminated, a strong tendency in the peritoneal investment of originally movable viscera to resume its normal characteristics. Here peristalsis will perform the functions of gentle massage and of active locomotion; the interposed layer of inflammatory connective tissue is gradually absorbed, then small hollow spaces lined with the restored serosa will form (the process is known to physiologists under the name of dehiscence, separation) between adjacent visceral surfaces; these will enlarge and become confluent, until finally complete separation is accomplished. Gynæcologists know how difficult it is to get a permanent result in ventrofixation. This is due to the tendency above described. I have observed with Dr. Kaufmann a case of complete

separation, after obliteration of the stoma, of the jejunum from the stomach, where several years before, gastro-enterostomy had been done by Dr. F. Lange.

Entirely different from these acutely formed adhesions are the connections between viscera of bands and membranes, such, for instance, as are known under the name of Jackson's veil. Here destruction of the peritoneal surface is absent; the forces producing these bridges of tissue are in their action slow and insidious. A large proportion of these bands remain unrecognized because they do not provoke striking symptoms. Symptoms will appear only where the growing bulk and the retraction and shortening of the fibrous components of these bands begin to encroach upon the lumen of the gut, provoking phenomena of chronic or acute stenosis.

We find further, that the beginnings of this new formation are mostly found at the very site of preëxisting normal suspensory bands, such, for instance, as the hepatocolic ligament. This becomes invested by a covering of translucent, membranous tissue, loosely adherent, and easily stripped off the ligament proper, which consists of connective tissue of definite, fibrous organization.

We find that wherever there existed a preformed congenital band, normal or exceptional, this can be readily stripped free from its newformed, delicate and slightly adherent membranous investment. The disputed question of whether these membranes are preformed or of new formation resolves itself into this, that Jackson's veil may appear anywhere along the gut, and that if it does appear at the site of a preexistent ligament, it becomes superimposed upon and incorporated with a ligament. There is no reason why such a superimposition should not take place, and in fact it is a common phenomenon for obvious reasons. The process, having begun at any one of these physiological straits of the gut, extends therefrom upward and downward. So we see the membrane extending from the hepatic flexure downward toward the cæcum, often meeting another membrane extending upward from the ileocæcal junction, until the entire segment is buried under a continuous sheet. To this tendency must also be ascribed the formation of the so-called double-barrel shotgun arrangement seen at the hepatic and splenic flexures, and that so often seen between the ilium and the ascending colon.

I have had many occasions to examine especially the hepatic flexure, while operating upon the gall-bladder or stomach. In many instances have I encountered a ligament that was pale, shining with the lucent whiteness of a normal ligament, and covered with normal, non-vas-

cularized and pale peritoneum. But whenever a Jackson's veil was found, the ligament was swathed in the superimposed folds of this membrane, extending mostly downward upon the ascending colon.

It may be said therefore, that looked at in the light of this observation, the seeming contradiction as regards the congenital or acquired origin of perienteric bands and membranes is easily resolved. As to the fundamental cause of the production of perienteritic growths, we unhesitatingly state the opinion that it must be looked for in a disorder of the mucous lining of the gut, and more remotely in the character of the intestinal contents. The normal bands are found in all individuals. Were these preëxistent bands alone adequately causal, then we ought to find intestinal disorder in every normal individual. This not being the case, we must look for something else to explain the facts, and here enters the biochemical factor, which comprises the chemistry of digestion and absorption beginning in the oral cavity and ending at the anal vent.

And herein we have, I believe, touched upon the most important etiological factor in this question, a factor the elements of which are very little known and are awaiting the master hand of a great investigator. Our knowledge of the biochemistry of digestion, comprising the rôle played by the glands of internal secretion and the nervous system, is in its very infancy and contains mostly a series of detached facts loosely connected by more or less daring speculation. It is very probable that disturbances of the normal biochemical processes in the digestory tract play the initial and most important part in the production of conditions which nowadays come under the care of physician and surgeon only after having become a chronic disorder. If the part of congenital abnormalities of attachment of the viscera were a fundamentally causal factor in the field under discussion, then pathological disturbances would have to be present in every case where such an abnormality exists. Such, however, is contrary to experience. There are numerous cases in which congenital abnormalities were found in cadavers of patients who never had suffered from any grave form of intestinal disturbance. On the other hand, whenever there is intrinsic trouble of the biochemistry of the intestine, inflammatory changes in preëxisting normal or abnormal (non-pathologic) bands are seen to appear, and membraniform, new-formed structures develop adjoining the place of intravisceral disorder. That this is true is proven by such an observation as the following history and post-mortem record:

Mrs. Betty Alexander, aged thirty-eight, housewife, Russian, was admitted to Mt. Sinai Hospital December 8, 1912, with an extensive and progressive ulcerative enteritis of the large intes-

tine, characterized by attacks of obstinate constipation relieved with difficulty by laxatives. There was a continuous discharge of blood, bloody mucus and pus. She had lost much flesh and strength. The attacks of constipation were mostly accompanied by high fever. She was prematurely senile, there being present a well-developed arcus senilis and much emaciation. The lungs and heart were normal; liver and spleen non-palpable; abdomen lax, no tumor could be felt. Beginning at the anus and extending upward in the gut as far as a slender proctoscope would reach, there was a continuous field of irregular deep ulceration, from which islands of intact mucosa were seen to project. Marked contraction of this ulcerated part of the rectum was evident. Much pus and mucus came down from above into the field of vision.

December 17: Colostomy on left side; the gut was divided and both ends of it were fastened into the wound. Undisturbed healing of the wound followed and much relief was experienced. Local treatment of the distal segment with nitrate of silver solutions was begun.

On January 15, 1913, the patient began to complain of wandering, sharp, colicky pain in the belly; fever set in with rises of the temperature up to 104° F. No tumor and no erection of the gut was then observed. A few days later pus appeared in the proximal segment of the gut. Evidently an ulcer had eaten into the surrounding tissues, causing an abscess which was discharged into the lumen of the intestine. Then the fever disappeared. This condition recurred several times, and the colicky pains became more and more intense and frequent, being felt by the patient once here, once there, over various parts of the abdomen. The bowels moved easily and regularly. In spite of a carefully regulated diet and the use of medicated irrigations this play continued until February 19, when the colostomy wound was revised in anæsthesia. Several fistulous tracts, leading into abscess cavities were found in the neighborhood of the proximal stoma. They were slit open.

February 26: Profuse discharge of pus from both stomata and from the anus. About that time the colicky attacks became very severe, reminding one of the tenesmus of dysentery. The pains were then mainly in the right side. The pus contained no amœbæ; but plenty of streptococci and the bacillus coli.

March 17: Defecation is regular, but attacks of colic are frequent and severe with visible *peristalsis of small intestine*. Fever remittent, continuous.

March 25: Sudden and unexpected death in syncope,—probably from cerebral embolism. The same day the abdominal viscera were examined.

General: Body of a middle-aged, much emaciated woman. Slight rigor mortis. In the lower left region of the abdomen, there is an old colostomy opening. Both stomata are patent. On the outer border dissecting up the abdominal wall, are evidences of abscess formation. Both loops of gut are adherent to the abdominal wall and exuding from the distal loop are a few drops of cream-yellow pus.

Abdomen: On inserting the hand in the abdomen, numerous dense adhesions are felt.

Small intestines: Many coils of small intestines are bound together by veil-like adhesions extending from one loop of intestine to another. These adhesions have fan-like extensions enveloping the intestine and are vascularized. The transverse colon is adherent to the loops of the ileum. In several places these adhesions have constricted the intestine, producing very narrow strictures with collapsed gut beyond, and distended gut proximally. No ulcerations are present in the small intestine. At the points of constriction, the mucosa is very thin.

Cæcum: The cæcum is imbedded in a mass of firm adhesions. The appendix is slightly rectrocæcal and presents a dilated cystic tip with a stricture formation

FIG. 1.—Ascending colon with last vestiges of former membrane. *a*, severed adhesional band.

about ¼ inch from the cæcal orifice. It measures 3½ inches in length. The tip is dilated and contains about 3 c.c. of creamy yellow, foul-smelling pus. The mucosa up to the point of stricture is ulcerated, the ulcers presenting scalloped, irregular edges and slight undermining. The cæcum is intensely engorged and congested. Ascending, transverse and descending colon present otherwise no abnormality, except for numerous adhesions and vascularized strands which pass across them.

Descending colon and sigmoid: At the junction of the descending colon and sigmoid, the colon has been divided for the purpose of colostomy. The proximal loop is greatly thickened, its outer coating being very thick and adherent; in the mesocolon is one small abscess cavity communicating with the proximal loop. The mucosa presents numerous longitudinal ulcerations the edges of which are scalloped and the base undermined, the probe passing for several centimetres beneath the mucosa.

Distal loop and rectum: The rectum is firmly bound to the pelvic cavity by means of dense adhesions. It is removed with considerable difficulty. Its walls are greatly thickened. The mucosa presents an irregular appearance. There are evidences of old, healed longitudinal ulcers. Its normal appearance is completely

obliterated by longitudinal strands extending the entire length of the rectum. The mucosa is absent on both sides of these longitudinal strands, these areas being fibrous and completely healed (see Fig. 2).

Stomach: Is dilated and contains a large quantity of fecoid material. Pylorus is open; duodenum shows no abnormality.

Pancreas: Is rather firm, otherwise normal.

Spleen: Is considerably enlarged, somewhat shrunken. It is pulpy in consistency and markings obscured.

Remarks.—1. It is to be noted that the ulcerative process in the portion distal to the colostomy was found practically healed. Absence of fæces and effective drainage with nitrate of silver irrigation must have brought about this change. The ulcerative process above the colostomy had not been checked for obvious reasons.

ulcerated mucosa + healed cicatricial con traction
normal mucosa
ulcerated mucosa + healed, cicatricial contraction
anus

FIG. 2.—Formation of ampulla-shaped pseudo-dilatation of lumen between two contracted areas.

2. The frequent colicky attacks of a wandering character, evidently affecting the small intestine, were due to extrinsic compressive stenoses caused by the bands of recent formation, so numerously found between the coils of small intestine.

In Fig. 2 can be seen a curious condition of the rectum. You observe that between two extensive areas of ulcerative proctitis, there remained a segment of normal mucosa. When, under the treatment with nitrate of silver, the ulcerated areas had healed and contracted, the intact segment, having preserved its normal lumen, became a sort of distended ampulla.

Fig. 3 is a sketch made by myself at the autopsy. It shows a double fan, starting from the posterior parietal peritoneum between cæcum and

FIG. 3.—Double fan-shaped membrane between ascending colon and a coil of ilium. Similar veils and bands were found between sigmoid flexure and small intestine and between main coils of small intestines.

ileum and extending on one side to the former, on the other to the latter viscus. Between various coils of the ilium and jejunum similar perienteritic veils were seen to the number of thirty or more. As this observation has demonstrated that membranes may occur not only about the several portions of the large intestine (where, especially about the cæcum and ascending colon, they are most common), but may, in the presence of irritation, develop also about the small intestine, it is proposed to abandon the limiting term of "pericolitis," and to substitute therefor the more comprehensive name of "*perienteritis membranosa.*"

The magnitude of the phenomena observed at this autopsy contains the strongest argument in favor both of the inflammatory character of the membranes and the unity of the process. It does not militate against the dignity of the factor of congenital bands; they also may become the seat of an infection proceeding from the mucosa. Thus, by dint of thickening and retraction, they may be converted into a pathological element; their function of physiological regulation of the transportation of the intestinal contents will be augmented and emphasized to a distinctly pathological degree.

Now as to the merits of the whole question, so much may be said. The surgeon has no opportunities to observe the beginnings of intestinal disorders leading to perienteritis. Almost without exception he is called upon only to deal with *end products of a long, pathological process.* The urgency caused by these end products is based either upon destructive changes producing peritonitis, or upon distress caused by obstructive encroachment upon lumen. Without accepting Lane's fanciful pathology we may say, that to him belongs the merit of having made the first attempt at explaining and remedying a condition previously much neglected and unrecognized. His endeavors are directed towards the elimination of organs that have become useless and detrimental. Much more meritorious will be the work of those who will clear up the pathology of the beginnings of constipation, and will thereby prevent the necessity for Lane's heroic surgery.

For those who wish to study the publications that appeared on our subject during the year 1914 the following synopsis is added.

January, 1914. 1. Pilcher, L. S.: Pericolic Membranous Films and Bands. ANNALS OF SURGERY, 1914, No. 1. Case viii. Band connecting large and small intestine, typhoid origin. Case XIV. Shotgun arrangement of ascending and transverse colon; bands connecting gall-bladder, duodenum and stomach; appendix and cæcum.

January, 1914. 2. R. Bland Williams.

January, 1914. 3. Joseph Rilus Eastman and Albert M. Cole: A very good study.

February, 1914. 4. Joseph Rilus Eastman: A Further Study of Pericolonic Membranes. *Surg., Gynæcol., and Obstetrics,* February, 1914, p. 228.

August, 1914. 5. Joseph Rilus Eastman: Experimental and Clinical Studies of Colon Stasis. *Journ. of the Amer. Med. Ass'n.,* August, 1914, p. 441. A meritorious effort. This paper was read last June in a symposium before the section of obstetrics, gynæcology and abdominal surgery of the Amer. Medical Association, Atlantic City. In an extended discussion following the reading of the paper of Eastman, Bonifield, William Mayo, and Chas. A. L. Reed, original views were expressed by Hugo O. Pantzer of Indianapolis: "Every individual who does not defecate three or more times daily must, in one sense, be regarded as constipated." Read the original!

November, 1914. 6. James T. Case: A Critical Study of Intestinal Stasis, Including New Observations and Conclusions Respecting the Causes of Ileal Stasis. *Surgery, Gynæcol., and Obstetrics,* November, 1914, p. 592. The importance of the incompetence of the iliocæcal valve as a causative factor is insisted on. Very interesting.

November, 1914. 7. Eisendrath and Schnorr: The Significance of the Jackson Veil. ANNALS OF SURGERY, November, 1914, p. 622. An excellent and exact study of material, living and cadaveric, the latter both adult and fetal.

December, 1914. 8. F. Gregory Connell: The Chronic Abdomen. A study of 19 cases in which iliac symptoms recurred after the removal of the appendix, as demonstrated at a second laparotomy. A very valuable contribution and worthy of close attention.

This list does not pretend to be complete.

THE BONE GRAFT PEG IN THE TREATMENT OF FRACTURES OF NECK OF FEMUR*

AUTHOR'S TECHNIC

By Fred H. Albee, M.D., F.A.C.S.
of New York

Fracture of the neck of the femur is by all means the most disabling of all types of fractures. These fractures were formerly regarded as occurring mainly in old age. Recent personal statistics, as well as those of other surgeons who have large fracture clinics, show a large number of fractures of the femoral neck occurring in individuals below the age of forty-five or fifty. Senile osteoporosis, associated with thinning of the cortex and absorption of many of the lamellæ of the spongiosa of the neck, is the chief cause of the increased frequency of this fracture in the aged, and, as would be expected, traumata of much less severity cause fracture in the aged more frequently than in younger individuals.

There seems to be no object, so far as treatment or prognosis is concerned, in classifying these fractures further than the single term, "fracture of the neck." The terms intracapsular and extracapsular are inaccurate and misleading. The capsular insertion to the neck of the femur is oblique, thus causing the joint to include more of the neck on its anterior and inferior surfaces than on the posterior and superior. Then, again, most fractures are oblique and diagonal, and are only infrequently strictly transverse. If any classification is used, that of Stimson is by all means the preferable one, *i.e.*, subcapital, or fracture through the neck, and fracture at the base of the neck. A fracture is apt to occur in one of these two places, either at the junction of neck with head, or with the trochanter. The associated outward rotation in epiphyseal separation or fracture occurs as frequently and is often more pronounced than in fractures of the neck, which fact cannot be explained by the more fragile posterior portion of the neck. The predominance of the external rotators, especially the short trochanteric muscles, is believed to be the more tenable explanation. Shortening depends upon the lessening of the angle between the femoral neck and the shaft or a sliding by of the fragments.

* Read before the Philadelphia Academy of Surgery, March 1, 1915.

TREATMENT OF FRACTURE OF THE NECK OF THE FEMUR

In speaking of the poor results obtained in treatment of fractures of the femoral neck by the conventional methods, an authority states: "At first one can hardly appreciate how startling these results are unless he has carefully studied various series of statistics; and wherever the usually accepted principles of practice are employed, the long side-splints with Buck's extension, there the average results are uniformly unsatisfactory."

Of value in this connection are the conditions existing in 16 cases of fracture of the limb observed by Scudder many years after the accidents. "In only 2 cases, or 12 per cent., could it be said that the leg was functionally useful."

Walker studied the records of 112 cases of fracture of the neck of the femur treated in Bellevue Hospital between 1906 and 1907. Only 15 cases, or 13 per cent., recovered good function.

The British Fracture Committee tabulated 91 cases, in which 87 of the patients were over fifteen years of age. Only 20 of the adults, or 23 per cent., recovered good function.

Unquestionably Whitman's abduction method offers better results than the foregoing. Certain men, however, have not obtained the favorable results secured by Whitman.

Cotton offers the following objections to this treatment: "First, many men are inclined to doubt the locking of the upper fragment at the limit of abduction, believing rather that tension on the abductor muscles gives the limit of abduction; second, there is real danger that in less expert hands the fragments may be forced by one another, not jammed together; third, plaster spicas in stout patients do not hold abduction firmly."

At best, fracture of the neck of the femur is one of the most difficult problems in all surgery. The anatomico-mechanical conditions, the poor blood supply, the sluggish osteogenesis, and the difficulty of fixation are all potent adverse influences to securing satisfactory union and good functional results, and it is believed that if ever radical measures are justifiable they are indicated in the treatment of this desperate condition. Realizing this, certain surgeons have employed the metal spikes to assure better approximation and fixation than could be obtained by non-operative measures. This method has not given uniformly good results because of the failure of sufficient callus formation.

An illustrative personal case was that of a woman thirty years of age, suffering from a fracture of the neck of the femur ununited after eight weeks. There was no destruction of the fragments from friction, nor was there any systemic disease to inhibit callus formation. It was a favorable case, and a tin-plated square steel spike, three and a half inches long, was driven into good position longitudinally through the centre of both fragments of the neck, which were in excellent apposition. The convalescence was uneventful. The wound healed by primary union, and at no time was there a temperature above half a degree, after the day following the operation. The operation, however, resulted in failure, and non-union occurred. Fig. 8 is a skiagram taken four months after the operation, showing that the spike, owing to its own weight and some destroying influence, had dropped through the lower portion of the capital fragment and no longer engaged it. The metal spike had not only destroyed bone, but it had inhibited callus formation in a region where osteogenesis is at a low grade, to such a degree that it prevented union or, at any rate, was a contributing cause to non-union.

To avoid the disadvantages of metal the author began, in 1912, to use a bone graft peg as a substitute for the metal spike. (For report, see author's report in *Murphy's Clinics,* June, 1913.) If these bone pegs are placed in the cervical fragments by the technic described elsewhere, an equally satisfactory amount of internal fixation is furnished at the same time that the disadvantages of a metallic foreign body are avoided, and the advantages of a living bone graft gained.

A strong autogenous bone peg, accurately fitted into a hole drilled longitudinally through the neck of the femur, with the fragments in good position, offers unquestionably the most ideal condition for the rapid and satisfactory union, in good position, of this difficult fracture. In other words, the influences adverse to union, enumerated elsewhere, are better overcome by this procedure than by any other treatment; also every argument for the autogenous inlay graft in ununited and selected fresh fractures of shafts of long bones holds equally in fractures of the neck of the femur.

Soft tissues are removed, if present, from between the ends of fragments; the fragment ends are secured in good apposition; callus formation is stimulated by the presence of the graft at the same time that the graft produces bone growth itself; and an osteogenetic bridge, capable of conducting both blood-vessels and bone-cells from one fragment to the other, is furnished.

Indications for Bone Graft Peg in Fracture of Neck of Femur.—This operation is believed to be indicated in all ununited fractures of the neck of the femur; in most unimpacted fresh fractures in oper-

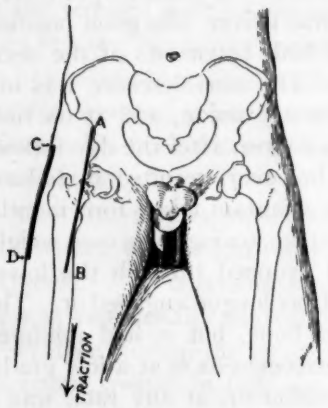

FIG. 1.—Drawing representing patient on Hawley traction table. *A B* and *C D* are skin incisions.

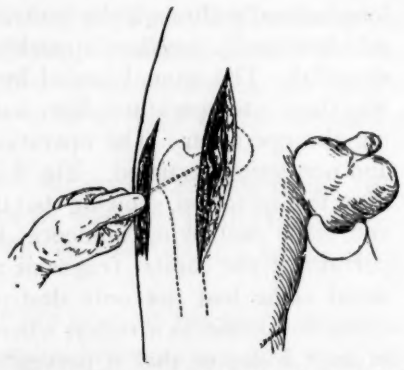

FIG. 2.—Drawing to illustrate author's method of determining with small hand drill the proper situation and direction for the motor drill. This hand drill is withdrawn as the motor drill is inserted (see Fig. 3).

able subjects under fifty years of age; in all old fractures of the neck or at the epiphyseal cartilage where malunion has resulted, with the neck depressed in a coxa vara relationship with the shaft. The bony

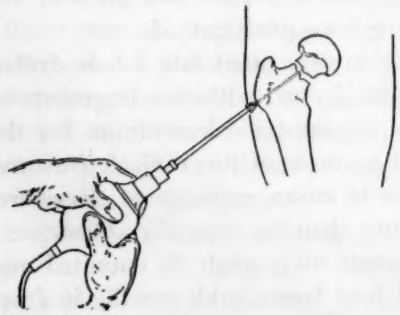

FIG. 3.—Insertion of motor drill.

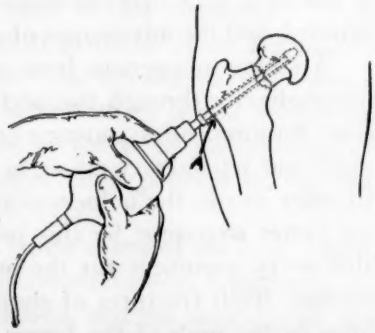

FIG. 4.—When the end of the burr has reached the space between the fragments and is ready to enter the capital fragment, a reading on the graduated shaft of the burr is taken at *A*, one is then able to tell just how far the burr should penetrate this fragment.

deformity is corrected by either a cuneiform or linear osteotomy, and placing the limb in full physiological abduction (Whitman). After the operative correction of these two latter conditions by the usual

cuneiform osteotomy, Hitzrot states that weight-bearing should be prohibited for at least a year. The employment of the bone graft peg reduces this time by at least six months.

Technic of the Author's Bone Graft Peg Operation for Fracture of the Neck of Femur.—A most careful iodine preparation of a wide field for operation should always be carried out. The pubes should be shaved on the day before the operation and the preparation started.

The patient should be placed upon some traction table (Hawley) which will allow, simultaneously, abduction and traction. The point

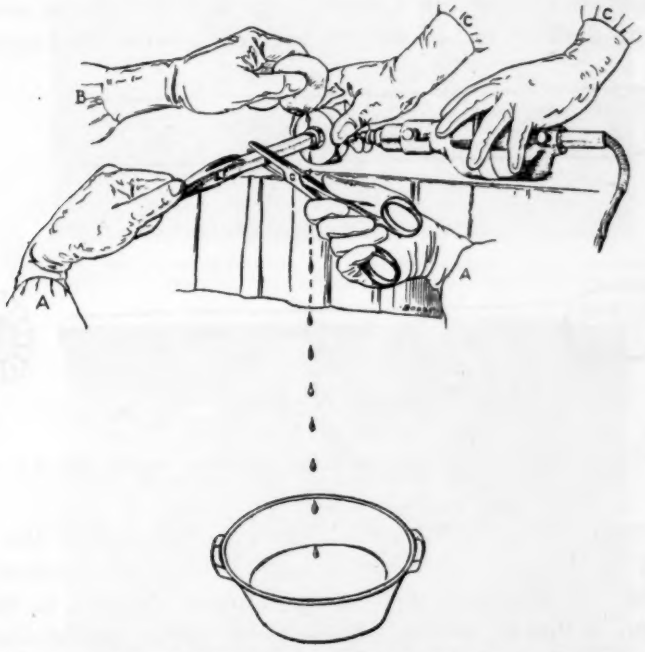

FIG. 5.—Graft from crest of tibia being pushed through the author's dowelling apparatus. *A A* is surgeon; *C C*, assistant; *B*, nurse.

of fracture is reached by an incision starting from a point a finger's breadth inside of the anterior superior spine and curved downward three to five inches along the inner border of the sartorius. The inner border of the muscle is exposed and retracted outward. The tendon of the rectus femoris is also exposed and retracted outward. The iliopsoas muscle is next exposed and retracted inward. The point of fracture is exposed and all soft tissue is cleared from between the fractured ends, which are curetted and freshened.

The limb is now placed in abduction and sufficient traction applied

to bring the fragments into good apposition as determined by both sight and palpation through the anterior wound. An incision two to three inches long is then made over and just below the great trochanter, which is exposed. With a small hand drill, the proper direction for the motor drill is determined by trial, as shown by observation through both wounds. The drill hole should be situated in the centre of the neck of both distal and proximal fragments, and parallel to the neck. The small hand drill may have to be reinserted in order to locate the proper tract for the motor drill. The motor drill should be held ready by the operator for insertion into the tract of the hand drill as it is withdrawn by the assistant. The motor drill, which forms a hole three-eighths of an inch in diameter, is pushed through the distal fragment until the burr end of the drill appears between the fragments, as

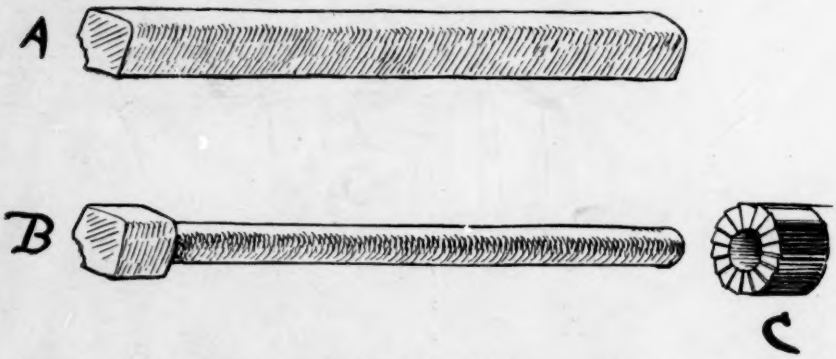

FIG. 6.—*A* is tibial graft. *B* is graft after being shaped into a peg, and is ready to be driven into burr hole in neck of femur. *C* is lathe cutter.

seen through the anterior wound. Just as the end of the drill is engaging the broken end of the proximal surface, a reading on the graduated drill shaft is taken at its entrance aperture in the great trochanter, so that by making additional readings it can be determined just how deep the capital fragment is being penetrated. By studying the skiagram, the length of this fragment can be very accurately determined, and hence the desired depth of the drill-hole obtained. When the fracture has occurred near the head and the proximal fragment is consequently short, the drill-hole should extend close to the articular cartilage of the head.

The drill is disengaged from the motor and left in place, to avoid any possible displacement of the fragments while the tibial graft is being procured.

The crest of the lower portion of the tibia is laid bare, and an area

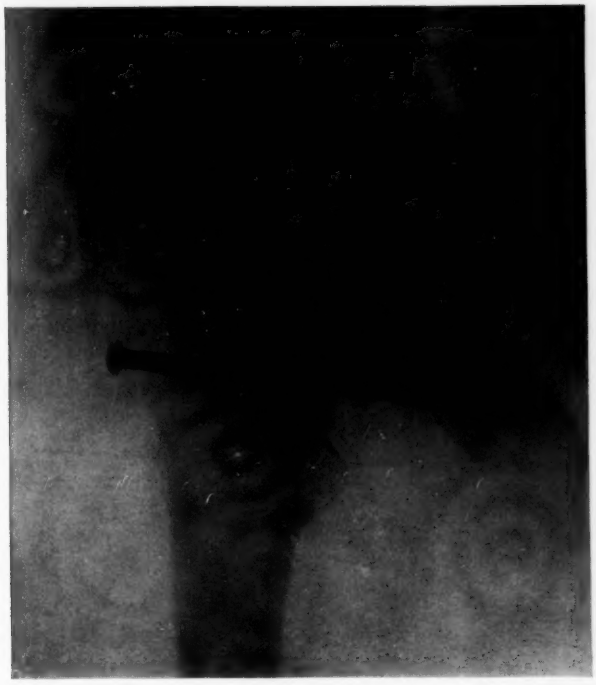

FIG. 8.—This spike was placed in the centre of head at operation. It has destroyed bone and dropped out of the capital fragment entirely, non-union resulting (see text).

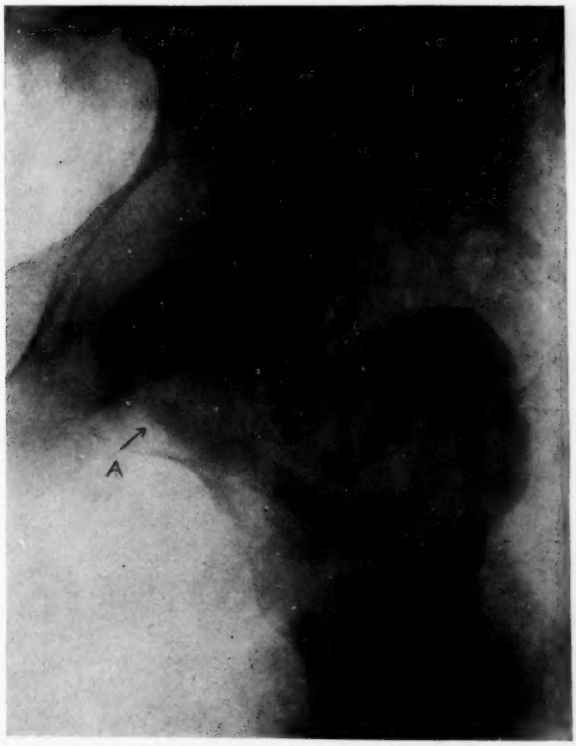

FIG. 9.—*A B* is bone graft peg three months after insertion. Firm bony union resulted immediately. It has been six months since operation and the union is firm. The graft was placed lower than it was intended, but did not interfere with the result.

of the desired size and shape is mapped out in the periosteum with a scalpel. The desired length of graft can be determined by the graduated scale on the motor drill. The cross-section of the graft should be just large enough to be shaped into the peg when the dowel shaper is used.

When the graft peg is ready, the drill is withdrawn from the femur and the peg inserted. The fit must be accurate because the dowel cutter is the counterpart of the drill used. This accuracy of fit is very important. Too tight a fit is undesirable because a pressure anæmia of the surrounding cancellous bone would be produced. Too loose a fit, or an irregular, inaccurate fit, would not produce good fixation or favor an immediate bony union of graft to the host fragments.

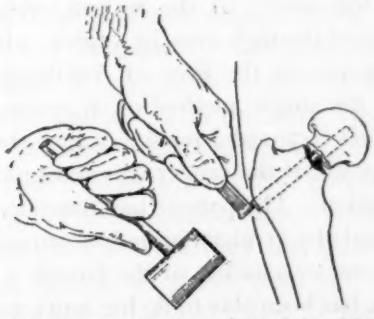

FIG. 7.—Drawing representing graft peg being driven home.

The deep fasciæ are approximated with interrupted sutures of No. 2 chromic catgut; the skin wound is closed with continuous suture of No. 1 chromic catgut.

The limb is put up in abduction (Whitman's position) in a plaster-of-Paris spica extending from the toes to the axilla. Three weeks after the operation, windows are cut in the plaster, and the wounds dressed. The dressing should be replaced with cotton for the purpose of restoring the tension of the plaster splint and retaining the fixation. The long spica should be continued for six weeks and followed by a short one for six weeks longer.

TRANSACTIONS
OF THE
NEW YORK SURGICAL SOCIETY

Stated Meeting, held February 24, 1915

The President, Dr. Frederic Kammerer, in the Chair

CARCINOMA OF THE RECTUM

Dr. J. A. Hartwell presented a woman, aged thirty-seven years, who had previously been presented to the Society on March 22, 1905 (Annals of Surgery, vol. 42, p. 275). This patient was operated upon on May 1, 1904, for cancer of the rectum, which involved the anal segment and ulcerated through into the vagina, which had been the seat of extensive lacerations at the time of childbirth. An artificial anus was performed by the simple method of drawing a knuckle of the sigmoid through the left rectus and passing a tube through the mesentery. Later a radical removal of the cancer was accomplished through a perineal and sacral incision. The patient has remained in perfect health to the present time, and the artificial anus has proved in every way satisfactory. There is one evacuation of the bowels a day, over which she has control, and she has been able to do her work without inconvenience. There gradually developed, however, a prolapse of the bowel by eversion, which was much increased by a severe fall last October.

On February 5 a laparotomy was performed, the prolapsed bowel drawn back into the peritoneal cavity, and firmly fastened by a series of sutures passing through all the coats except the mucosa, to the abdominal parietes. This, apparently, cured the prolapse. At the operation a thorough exploration of the abdomen was made, and there was no evidence of any recurrence of the cancer. The patient is exhibited as a permanent cure of cancer of the lower portion of the rectum which was in an advanced stage at the time of the operation. A point of interest also is found in the demonstration of the satisfactory condition patients may be in, in spite of an artificial anus.

Dr. Hartwell also presented a man, thirty-nine years of age, who was admitted to Bellevue Hospital in January, 1915. He stated that for eight months he had been conscious of some disease in the lower bowel, had been having considerable pain just inside the anus, and has passed blood on several occasions. The disease was apparently progressive.

Examination showed an ulcerated carcinoma about two inches in diameter with markedly heaped up and indurated edges, the lower margin of which was less than two inches above the anus. The growth occupied the anterior and right portion of the bowel, and seemed to have penetrated deeply through all coats so that it was adherent to the structures outside the rectum. There was no evidence of glandular involvement to be made out.

On January 25, 1915, the radical removal of the disease was done by the combined method. A suprapubic incision demonstrated that the growth extended from the seat of the ulcer in a pencil-like cord on the posterior wall of the bowel for a distance of thirteen centimetres upward. This indicated that nothing less than a complete amputation, with a permanent artificial anus, would be of any value. The sigmoid was therefore divided between Peyer clamps, about four inches above the cord-like extension of the growth. The two ends were cauterized and inverted with a linen suture, in the same way that the duodenum is closed in a gastric resection. The proximal end was then drawn through the fibres of the left rectus, and thence for a distance of two and a half inches outward under the external oblique fascia, and then through a skin incision. Here it was anchored without opening. The superior hemorrhoidal arteries were then tied close to the lower segment, the peritoneum divided on either side, and the lower segment freed with all its surrounding fat and tissue as far down as possible. The released portion was crowded down against the perineum, and the inferior peritoneal wall carefully closed. Abdominal wound sutured in layers without drainage.

The patient had been in the Trendelenburg position during this part of the operation. The thighs were now flexed well upon the abdomen, the lower end of the table still being elevated, thus placing the perineum in almost a horizontal plane, and giving an easy access of the parts as far backward and upward as the sacral vertebræ. The anus was then closed with a purse-string suture and its margin burned with the cautery. An incision was carried from the tip of the coccyx forward to within one inch of the anus, which it then encircled and thence passed forward to the edge of the scrotum. The dissection was carried upward, well outside of the anal sphincter, the levator ani muscle cut and all the structures connected with the rectum as far backward as the hollow of the sacrum were lifted forward. A sound was then passed into the bladder. All the rectal and perirectal tissue, laterally and anteriorly, were separated from the urethra and prostate, and the dissection gradually deepened toward the peritoneum until the entire

lower segment of the bowel was freed and delivered. At a point on the right side the growth had ulcerated through to the lateral wall of the pelvis, through which some soiling of the parts took place. Aside from this the wounds were entirely aseptic. The peritoneal floor was repaired by drawing the levator ani muscles together, and the superficial structures were then sutured with silkworm-gut, a small gauze drain being inserted to control subsequent oozing. The bowel was opened on the second day, and primary union took place throughout all the operative wounds.

This method of operation proved eminently satisfactory. It gives a complete exposure of all the involved parts, permits of eradication of the disease, leaves the patient with a very satisfactory anus, and is attended with rather less shock than other methods. The time in this case was a little under two hours, fifteen minutes of which was consumed in forming the controlled artificial anus, which, of course, in case of necessity, is not an essential. The Trendelenburg position greatly facilitates the operation, and the subsequent exaggerated lithotomy position, with the foot of the table still elevated, makes the whole operation almost bloodless. Furthermore, it frankly admits the fact that in low lying cancer of the rectum we have no choice except that of forming an artificial anus above. Any attempt to save the sphincter is disastrous.

The specimen removed in this case consists of 18 centimetres of the lower end of the rectum, and all the perirectal tissue, including a small section of the anal skin. At the recto-anal junction there is a crater-like ulcer 5 centimetres in diameter, with ragged, indurated edges, and a nodular indurated base. At the centre of this the growth has involved all the coats of the rectum. The perirectal tissue is composed of fat, showing many lymph-nodes, some of which are infiltrated with the same yellowish-white tissue found in the base of the ulcer. There is a thin cord-like line of induration 13 centimetres in length, situated in the submucous coat of the rectum, on its posterior aspect, beginning at the upper edge of the ulcer and running upward in the direction of the long axis of the gut. The mucosa over the extension of the growth is absolutely normal, and the two are not adherent to each other.

Microscopically, the ulcer consists of neoplastic tissue composed of large branched, atypical, glandular acini, lined by tall cylindrical cells containing elongated oval nuclei. The stroma is abundant and consists of cellular connective tissue, infiltrated with inflammatory cells. Some of the tumor acini also contain desquamated epithelial cells, and polymorphonuclear leucocytes in the form of plugs. A section through the

rectum in the cord-like line, about 8 centimetres above the ulcer, shows a metastasis in the submucosa. There is a metastasis in one of the lymph-nodes in this cord. There was no tumor tissue discovered in the rectum above the cord-like extension. Diagnosis: *Adenocarcinoma* of the rectum.

The case is shown as an illustration of what Dr. Hartwell believes to be the proper method of attacking these cases, no other method yet devised meeting the requirements so thoroughly. It also illustrates the very important fact which Handley has emphasized that these carcinomata may extend for a very long distance in the submucosa without involving the mucous membrane, or passing grossly into the perirectal tissues.

TUBERCULOUS PERITONITIS

Dr. Frederic Kammerer presented two cases of tuberculous peritonitis.

The first case was that of an Italian woman of twenty-seven, married, operated upon three years ago. When first seen she had suffered from indigestion for eight years. During the last six months she had had paroxysms of abdominal pain, which had become very severe during the past weeks and which were accompanied by distention of the abdomen and occasional vomiting. She had lost about twenty-five pounds during the last year or two.

Physical examination revealed the presence of a considerable amount of free fluid in the abdominal cavity. Visible peristalsis of the intestine was pronounced. No pulmonary changes. A tentative diagnosis of tuberculous peritonitis was made, which was fully confirmed at the operation done three years ago. A large amount of fluid was evacuated through a median incision at that time; the entire peritoneum, both parietal and visceral, was studded with miliary tubercles. In the lower portion of the small intestine three distinct strictures were found, which gave the impression of small tumor masses lying within the intestinal lumen. There were no adhesions of the intestines among themselves. The general condition of the patient was so poor that it hardly seemed justified to risk further interference, but it was also evident that unless something was done for the intestinal strictures, the prognosis was absolutely unfavorable. Dr. Kammerer, therefore, added two entero-enterostomies, the one towards the stomach incompletely excluding from the fecal circulation about nine inches of intestine in which one of the strictures was situated; the other excluding one and a half feet of gut, in which the other two strictures were found. The patient

made an uneventful recovery and was immediately relieved of her distressing symptoms. To-day, three years after operation, she weighs one hundred and thirty pounds, a gain of thirty-seven pounds since her discharge from the hospital.

The second case was that of a young woman of sixteen, operated on about two years ago. When first seen by Dr. Kammerer she had been ailing for three months, after a rather acute onset accompanied by temperatures ranging to 104°. There was no tubercular family history. In the umbilical and right lumbar region a hard nodular, very movable mass about six inches long could be felt, apparently not connected with the genital organs. Rectal examination disclosed the presence of similar masses in the abdominal cavity at the level of the promontory. Through an incision along the outer border of the right rectus a considerable quantity of fluid was evacuated. The tumor proved to be an infiltration of the greater omentum, which latter was converted into a flat mass, from one to two inches thick, its anterior surface having a square shape, with sides six to eight inches long. The lower edge of this mass was firmly adherent to the anterior abdominal wall, its upper edge was matted together with the transverse colon. The hand could be passed along the left border of the tumor into the pelvis, which contained other hard nodular masses of various sizes. The entire peritoneum was covered with miliary eruptions in this case also. The abdomen was closed without drainage. The patient made an uninterrupted recovery and was discharged from the hospital on May 3, 1913.

During June and July she received injections of tuberculin-Rosenbach, which had at that time been so highly recommended by Professor Kausch of Berlin, for the treatment of tuberculous peritonitis, in gradually increasing doses. On August 4, the last injection (2 grammes) was given. At this time the large mass within the abdomen had almost entirely disappeared and the smaller tumors, which had been felt per rectum, had also decreased in size. Although a slight febrile reaction had followed each injection, the patient had gained three pounds during the course of this treatment. It should be distinctly stated here that when the injections were begun, a month after the patient had left the hospital, the abdomen presented about the same appearance as on admission. The patient spent the latter part of the summer of 1913 at the seashore, where her abdomen was exposed to the rays of the sun for about an hour every day. During the winter of 1913–1914 she was again injected with tuberculin-Rosenbach, the course of the treatment being continued for a longer period, and during

the following summer (1914) she again took her sun-baths. No further treatment has been given. As the result of these various procedures, her weight has increased about thirty pounds since she left the hospital. The patient was examined by Dr. Kammerer a few days ago, and also by her family physician. At the present time no trace of any abdominal tumor can be discovered. She is in excellent general condition, although still somewhat anæmic.

Dr. Kammerer believed that the first case presented was evidently an intestinal tuberculosis complicated with a general, and not a localized, tuberculous peritonitis. From the fact that no adhesions were present and the serosa at the site of the constrictions was not more affected than at other parts of the abdominal cavity, it was fair to assume that an ulcerative process within the intestine was in this instance the etiological factor, leaving out of question the primary or secondary nature of this lesion. Resection of the intestine was of course impossible in this case, owing to the low condition and the general involvement of the peritoneum of the patient. But the case shows that incomplete exclusion may give a good result even in the presence of a general tuberculous peritonitis.

It was Dr. Kammerer's opinion that the second case should be classed as an example of exudative and adhesive tuberculous peritonitis. From the course of the case one might infer that no degeneration or suppuration had as yet occurred in the large tumor masses found at operation, as the ulcerative form of peritonitis is scarcely influenced in a favorable manner by operation.

According to our modern conception of a permanent cure, it was too early, two or three years after operation, to speak of the same in connection with the two cases presented. Of the large number of immediate cures (according to some authors 85 per cent.) only about 15 to 25 per cent. remained cured after two years. The speaker disclaimed any intention of attributing a curative effect to the injections of the special tuberculin used in the second case, more especially as the improvement following abdominal incision generally only begins after several weeks have elapsed. It may have been a coincidence, but the rapid disappearance of the tumor-masses in the abdomen during the course of treatment was certainly remarkable.

Dr. Robert T. Morris stated that he had rather come to the conclusion that it was not desirable to remove the masses in cases of tuberculous peritonitis. He had reported two cases, one in which there was a large mass of adventitious tissue surrounding a cyst. In that case several pints of fluid were evacuated, although it was not

recognized as tuberculous fluid at the time. The rise of temperature indicated by the charts, however, suggested the possibility of a tuberculosis, which was confirmed by a positive von Pirquet reaction. The patient was placed upon tuberculin treatment and has been well for some months. In that case only some parts were removed which were found to be entirely composed of adventitious tissue. In the second case the omentum was found to be very largely thickened. This patient has also been treated successfully with tuberculin.

With regard to recurrence of tuberculosis in this vicinity after a considerable lapse of time, Dr. Morris mentioned a case already reported in which there was a tuberculous appendix with some tubercular masses. The appendix was removed and the patient made a complete recovery. Within two years, however, she developed a general tubercular peritonitis. This was drained and the patient had then apparently wholly recovered. In another case of tuberculosis of the appendix there was subsequent development of acute general miliary tuberculosis involving both lungs. In that instance the patient had also recovered.

Dr. Morris emphasized the fact that subsequent prolonged use of tuberculin was a very important factor in the ultimate cure of these patients.

Dr. Willy Meyer stated that inasmuch as the clinical pictures of carcinoma and tuberculosis were often closely resembling, the diagnostic value of removing a small piece of tissue (omentum) at the time of operation for microscopical examination could not be too strongly emphasized. He called attention to one of his cases, sent in as tuberculous peritonitis, in which this was done, with the result that the tissue was found to be carcinoma.

EXCISION OF BREAST FOR CARCINOMA IN A WOMAN EIGHTY-FOUR YEARS OF AGE

Dr. William Darrach presented a woman eighty-four years of age, who first noticed a mass in her right breast three months before coming to the hospital. This grew rapidly in size and about a week before had broken down in its centre. The ulcerated area had increased in extent and had bled slightly on several occasions. The patient thought that she had lost a little in weight but had not noticed any impairment in her strength. She was a very robust old woman, with good color and marked energy. In the upper portion of the right breast there was a hard, irregular, painless mass with indistinct outlines, which moved slightly on the deeper structures and showed in its

centre an ulcerated area with irregular margins and a fungating purplish-red base. The nipple was retracted and was situated just below the margin of the ulcerated area. The skin over the rest of the mass was somewhat thickened with a slight resemblance to pigskin. No axillary lymph-glands could be felt.

On June 17, 1914, the patient was operated upon, being completely prepared before the anæsthetic was started. Gas and ether were used. An elliptical incision was made, passing three inches away from the ulcerated area and the flaps dissected up on each side. The whole breast was then excised with the underlying pectoral fascia, but leaving the muscle intact. The axilla was not attacked. Bleeding points were tied off and the skin closed with silkworm-gut and silk. A cigarette drain was introduced into the lateral portion of the bed through a stab wound in the skin. Dry dressing and binder were then applied. The time of operation was fourteen minutes. The patient was put in a sitting posture in a Gatch bed a few hours later and was allowed up in a chair on the third day. The night after the operation she managed to loosen the bandage sufficiently to scratch the wound. She repeated this on three other occasions during the first three days. On the sixth day a reddened area appeared at the upper portion of the wound and when the edges of the skin were separated a drachm of thick, foul-smelling pus was evacuated. This had completely healed when she was discharged from the hospital thirteen days after operation.

The pathological examination showed a mass six by five centimetres, occupying the whole depth of the breast and apparently involving the pectoral fascia. Under the microscope it was seen to be made up of epithelial cells arranged in an alveolar manner and extensively invading the subcutaneous tissue and the breast. The latter showed marked atrophy with a good deal of connective tissue. The epithelial cells of the tumor in general were of large size with marked mitotic figures. Some places showed degeneration, with pale nuclei and fatty replacement. Near the surface and extending down into the interior there was extensive round-cell infiltration and extravasation of polymorphonuclears. The diagnosis was carcinoma of breast with ulceration.

She was visited six months later by the Social Service nurse who reported that she was in very good health and was going out to work every day. To-day, eight months after the operation, she is in the best of health with no local signs of recurrence. She lives on the fourth floor of a tenement and goes to work as a seamstress every

day at eight, returning at four or five. In addition she does her own house work, as she lives alone.

It was Dr. Darrach's opinion that this case seemed to illustrate the wisdom of occasionally departing from the beaten path and breaking some of the rules of surgery. A complete operation with removal of the pectorals and axillary contents seemed to entail too much risk and the simpler palliative operation promised to avoid, at least for a while, the danger and inconvenience of the bleeding ulcerating mass. A similar case was in the ward at the same time and the same operation was done, the woman being seventy-six, but apparently much older than the patient presented. She is still well and free from recurrence. Dr. Darrach emphasized the fact that of course these were both recognized as palliative operations only, with no hope of a prolonged cure, and performed solely for relieving pain or distress and for controlling the important factor of hemorrhage from ulcerating surfaces.

Dr. Arpad G. Gerster stated that in all his experience he remembered no patient of eighty-four with this condition, the oldest patient suffering from carcinoma that he had observed being a woman of seventy-nine. This patient was brought to him by a young doctor, a zealous new graduate, who had taken charge of her case the day before, had made a diagnosis of carcinoma, and decided that immediate operation was necessary. When Dr. Gerster examined the patient he found that she had no breast; the skin was drawn in concentric folds to the place where the breast had been originally situated, where there was a granulating ulcer about the size of a quarter, in the middle of a deeply retracted scar. The axillary glands were affected and just palpable. Upon inquiry the patient told him that she had had the tumor for forty-six years. He then advised the doctor to take her home and let her alone. This was evidently one of the mildest forms of carcinoma, indicating what enormous differences there may be in the virulence of carcinomata. The patient had acquired the condition when a young woman and went through more than half her life without metastasis. He believed that in this instance operation might have led to death, while abstention from interference may rather prolong life.

Dr. John A. Hartwell mentioned a case of a man, sixty-nine years of age, who had noticed a tumor about the size of a hickory nut in the region of his left breast nine months before. At the time he presented himself at the Bellevue Hospital, there was a growth the size of a large apple, which occupied the whole region of the breast,

and protruded outward two and a half inches from the surface of the chest wall. The skin was ulcerated through and the tumor had the color of sarcoma. The tumor was removed under local anæsthesia by the same operation as performed by Dr. Darrach in his case, not removing the muscle, but cleaning out the axilla and taking off the whole breast and pectoral fascia. Microscopical examination showed a very actively growing carcinoma undergoing degeneration.

DORSAL PACHYMENINGITIS CURED BY LAMINECTOMY

Dr. Charles A. Elsberg presented a patient who had been operated upon fourteen months before for a pachymeningitis in the upper dorsal region, the patient having had pain in the back, increasing in severity for four years and increasing spastic paraplegia for one year. Operation revealed a tumor-like thickening of the dura at the level of the first dorsal segment, which caused marked compression of the cord. The affected dura was excised after typical laminectomy and the exposed cord covered by cargile membrane. Recovery from the operation was uneventful and the patient was presented entirely well. For some months after the operation she suffered from root pains in the first and second dorsal posterior roots, but these disappeared entirely and her spastic paraplegia rapidly disappeared so that she was able to walk around three weeks after the operation.

In reply to a question by Dr. Hartwell as to whether there was any etiological factor in the case, Dr. Elsberg replied that there was a history of some spinal trouble in childhood whose nature was unknown.

PITUITARY CYST RELIEVED BY INJECTIONS OF POSTERIOR LOBE EXTRACT

Dr. Charles A. Elsberg presented a young girl of twenty-three, who had not menstruated for six years and had suffered from severe headaches for three months with marked asthenia and pallor. For three months there had been progressive diminution in vision in the right eye and some diminution of vision in the left eye. There was temporal hemianopsia in the right, and temporal pallor of the left eye. X-ray showed normal sella turcica. The patient left the hospital after one month. She returned a month later with all the symptoms much worse. The vision in the right eye was almost gone.

Dr. Elsberg performed a right subtemporal decompression which resulted in some improvement in the right eye and disappearance of the headaches. The patient was re-admitted to the hospital two months later with all of the former symptoms much aggravated. The head-

aches were very severe; the right eye was blind, the sight in the left eye very poor; she was very pale and weak; her pulse could hardly be felt; at the least exertion in raising her head she would have an attack of syncope. Daily injections of posterior lobe extract were begun. There was at once a decided improvement in her general condition. The blood-pressure, which had been so low that it could not be determined, improved, and after the injections the systolic pressure was seventy-five and the diastolic fifty-five. The patient left the hospital after six injections considerably improved. Six weeks later she presented herself practically well. She had gained twenty-five pounds in weight. Her headaches had disappeared. The vision in both eyes was normal with normal fields. All evidence of temporal hemianopsia had disappeared. Dr. Elsberg declared that this was a most unusual and striking effect of glandular treatment.

RESECTION OF SUPERIOR MAXILLA FOR SARCOMA: CONDITION TWELVE YEARS AFTER OPERATION

Dr. Elsberg presented a young man, twenty-two years of age, in whom he had removed the left superior maxilla for sarcoma twelve years ago. The case had been shown at previous meetings of the Society because of the remarkable new formation of bone. The patient was entirely well and the deformity hardly noticeable.

Dr. Robert T. Morris stated that in his opinion it was better to excise the entire superior maxilla, calling attention to the fact that oral surgeons now manufacture an apparatus which can be comfortably worn and which renders the defect of this radical operation hardly noticeable. He particularly mentioned a case in which he performed a very extensive removal of the superior maxilla, and in which the patient was now wearing this apparatus adjusted in such a way that the existence of the deformity was not perceptible.

ANKYLOSIS OF THE INFERIOR MAXILLA

Dr. Elsberg presented a case of ankylosis of the lower maxilla secondary to scarlet fever, of ten months' duration. The boy had been unable to open his mouth at all for this length of time, and he was nourished by small quantities of fluids and semi-solid material, which he pushed into his mouth by peculiar manipulations. The X-ray showed a large mass of bone around the temporomaxillary joint on the left side. After temporary resection of the zygoma, it was found that a

solid mass of bone, at least one and one-half inches thick, connected the inferior maxilla with the base of the skull, and that there was no temporomaxillary articulation left. The entire mass of bone was removed with rongeurs. A flap of temporal muscle was interposed. It was then found that the teeth could be separated a distance of one and one-half inches. The wound healed by primary union and the mobility of the jaw has persisted up to the present time.

Dr. Willy Meyer mentioned the case of a young man twenty-eight years of age who came under his care about two years ago, with a history of having fallen upon his chin when six years of age. On examination he presented total ankylosis of both mandibular joints. The X-ray revealed a bony mass on both sides without a trace of articulation. Dr. Meyer operated upon him, closure of the wounds being performed in two stages by means of secondary suture. On account of severe hemorrhage the original plan of operation to turn in a fascia or muscle flap was frustrated, but sufficient bone was removed to give the patient the use of the maxilla. When last seen by him, the patient could separate the jaws very well (Annals of Surgery, vol. lviii, p. 698).

Dr. Meyer in concluding noted the remarkable fact that sometimes even in spite of total ankylosis with inability to separate the jaws for even the slightest distance, these patients manage to feed themselves and live on for a period of many years. By having a tooth or two removed, better entrance is gained to the oral cavity. In the case reported, this had not been done.

PERIENTERITIS MEMBRANOSA

Dr. Arpad G. Gerster read a paper with the above title for which see page 74.

Dr. Lewis S. Pilcher stated that he found himself very much at one with the views expressed by Dr. Gerster. In a slight review of the subject he mentioned the views of such students as Professor Flint and the statements made by such investigators as Dr. Eastman of Indiana, both of whom had given special attention to the etiology and pathology of this subject. He noted, however, that the profession were forced to recognize the fact that conditions had to be treated, which to practical surgeons were diseased conditions rather than errors of development, although they may have had their beginning in many conditions which were present in fetal life. The attention of the profession had been directed to the more advanced conditions of adult

life by the observations of Lane, of London, and although it was Dr. Pilcher's belief that hardly anyone beyond Mr. Lane and his immediate disciples were willing to accept Mr. Lane's explanation of them, he felt that Lane ought to be duly credited with having so strongly drawn attention to them.

If it was true that the conditions under discussion produced positive obstruction of the ready and normal onflow of the intestinal contents only when they became markedly accentuated, then those more exaggerated conditions found far beyond the embryonic period should certainly be surgically considered. Many surgeons have looked upon these as the result of infections through the bowel wall, diffuse and long continued, and proliferative in their action, and having as their final result a product which in a certain proportion of cases at least positively constricts the lumen of the bowel. Having repeatedly found these constricting bands and crippling films in his work and positively identified them, Dr. Pilcher could not avoid the conclusion that their presence was an active cause of the symptoms to relieve which intervention had been necessary. As to the rôle of traction in their etiology, since in every day life in every active person traction was being continuously exerted upon the fibrous structures that hold in place all intra-abdominal organs, he could not accept the theory that simple traction in itself could be the cause of the occasionally occurring fibrous overgrowths that constitute the pericolic films and bands under discussion. As to their possible embryonic origin he called attention to the fact that in almost every case patients had far outlived the conditions which are embryonic before the development of function-embarrassment, and hence he had to conclude that while the fact was exceedingly interesting as a study, it had very little significant or practical bearing upon the surgical question. There therefore remained, it seemed to him, as the most rational explanation of the development of these crippling and constricting fibrous sheets and bands, infection transmitted through the intestinal walls due to stasis of the intestinal contents, such infection being the real and important cause of the perienteritic bands with which the surgeon has to deal. It is not to be denied, indeed it is extremely probable, that the final fecal stasis may have been caused by a ptosis or some degree of appendical inflammation reacting upon faulty conditions that had been transmitted from the period of embryonic development.

Dr. Pilcher noted the fact that although many surgeons as yet were unwilling to admit that the condition under discussion was a

very important one, he felt from his own personal observations that those who first identified it and those who later elaborated the knowledge upon it, had added a very definite valuable asset to surgery. Furthermore, he felt that as it was recognized and treated more and more successfully, it would be found to be a means of overcoming many chronic disturbing conditions, the treatment of which had too often been a source of disappointment to surgeons.

Dr. John A. Hartwell stated that it was a great relief to hear two such able men as Drs. Pilcher and Gerster cast a certain amount of doubt upon the importance of many theories that had been advanced as the cause of this condition, and to learn that in their opinion it was definitely inflammatory. It was his opinion that the clinical importance of the subject originated in a rather blind groping on the part of some surgeons to explain on anatomical and pathological grounds symptoms that were caused by other conditions. To substantiate this belief, he called attention to the cases of tuberculous peritonitis presented by Dr. Kammerer, wherein extensive adhesion formation had taken place throughout the abdomen without producing very great disturbance in the functioning of the intestine. In view of this fact, Dr. Hartwell felt that surgeons were treading on very thin ground when they attempted to assign a definite clinical picture to the delicate Jackson's membrane and dignified it as being the cause of symptoms, or when they attached very great significance to the removal of those veils as being of any great advantage in curing the symptoms which they were supposed to cause. He believed with Dr. Pilcher that only when the band became an actual menace to the mechanical activity of the intestine was it a matter of surgical consideration.

In concluding Dr. Hartwell stated that there was doubtless a double meaning to the statement of Dr. Pilcher that the discovery and lately elaborated discussion upon this subject had been a valuable "asset" to surgery; that it had been a valuable asset to surgeons he had no doubt, but he was not so certain that it had been a valuable asset to our knowledge of the conditions. The hope of finding an explanation for the symptoms and ascertaining whether they might be relieved by the aid of the knife or whether they were caused by factors beyond the aid of surgical interference justified their further careful study and discussion.

Dr. William Darrach stated that it was his opinion that whether these veils were due to congenital development, to contraction or to inflammatory conditions was not the main issue; they were frequently

found at all events when the abdomen was opened, either for the purpose of discovering them or for some other reason, and he wished to know the custom of Dr. Gerster and others when meeting these conditions. With the exception of the extreme cases where conditions had gone on to a point of constriction and interference with the normal flow of the intestinal contents, Dr. Darrach believed that such veils were usually present in a purposeful way—probably to anchor and support the large bowel, distended beyond the normal amount by gas or other products of inflammation. The extreme cases he felt called for surgical treatment, but it was a question as to what treatment could be properly instituted for the other cases.

Dr. Gerster stated that he had not dealt with this subject from the operative point of view which, though interesting, was relatively not as important as understanding and comprehending the pathology of the process. Surgeons only have an opportunity of visualizing these structures when performing an operation, although many patients with similar conditions never reached the hands of the surgeon because of the non-existence of serious symptoms calling for surgical interference. The utter futility of merely dividing such membranes from the point of view of a permanent cure of the intestinal disorder was demonstrated by their rapid reformation; in spite of a possible temporary subsidence of the symptoms, patients were really not cured by operation, which could do no more than relieve mechanical obstruction. It was therefore Dr. Gerster's opinion that the cause of this condition was to be sought in something beyond the formation of these veils, something intra-intestinal which was the cause of their formation. Surgery could relieve mechanical difficulties, and do nothing else; it could not eliminate enteric disorder affecting the mucosa of the gut.

Particular reference was made to Dr. Pilcher's remark, that many surgeons to-day did not regard the subject an important one. Dr. Gerster stated that when they had once seen a case of obstructive ileus with gangrene of the ascending colon, due to contraction of the hepatocolic band, such as he had seen, then perhaps these surgeons would admit that the subject was important. Dr. Gerster stated that when he first read about this subject he also failed to be impressed; but when there had come under his care, both at the hospital and in private practice, cases in which the patient had developed a pain in the right side of the abdomen, with fever, constipation, vomiting and all the symptoms of appendicitis, where a good diagnostician had made the diagnosis of appendicitis, and this same appendix having been removed

was found to be normal, then he began to take note of the condition. It was repeatedly observed that such a patient while upon a diet with bowels kept freely open, felt well. When, two or three months afterwards, he had resumed his old vicious diet he came down again with another "appendicitis," that is, trouble in the right iliac fossa simulating appendicitis. These are the patients who wander from one hospital to another clamoring for relief, operative or other. Their number is considerable. It stands to reason that the removal of the normal or of a diseased appendix cannot effect the cure of a chronic enteritis. We must endeavor to recognize those cases in which there are cæcal symptoms in the presence of a normal appendix. In these the therapy, medical in the first place, surgical only where obstructive symptoms be present, must be directed towards the enteritis.

Dr. Gerster further stated that from his first observation of these membranes, he never looked upon them as the cause of the trouble, believing them to be secondary to the intrinsic disorder of the gut. Similar veil-like structures are found about the uterus, uterine adnexa, stomach, gall-bladder and about any portion of the large intestine. In the case related in his paper the entire intestinal tract, the small and large intestine, was invaded by these formations. The causal factor was an extensive streptococcus ulceration of the sigmoid flexure. A low degree of infection (Adami's "subinfection") had evidently involved the entire peritoneal surface, causing Jackson's veils to appear everywhere. Large and small intestine were concerned in the process, and the retraction of several of the veils connecting two coils of small intestine, had led to obstructions of the small intestine, a truly enlightening finding!

Dr. Gerster agreed with Dr. Hartwell as to the need of further careful study of these membranes. Many cases existed in which for some reason or another very extensive veil formation had taken place without producing serious acute or chronic obstruction. He also accepted Dr. Hartwell's remark that the removal of these veils would not effect a cure of the trouble; at best it could only eliminate stenosis due to compression by a retracting membrane. If the surgical procedure is not supplemented with proper internal medical treatment, directed towards the cure of the intestinal disorder of the mucosa, nothing will have been accomplished but a piece of surgical "plumbing." In this connection he mentioned the fact that surgeons as well as the general practitioner did not pay to chronic intestinal disturbances the attention they deserved. The complaisant laxative has become a generally accepted and generally abused *pons asinorum*.

Stated Meeting, held March 10, 1915, *at the New York Academy of Medicine*

The President, Dr. Frederic Kammerer, in the Chair

CARCINOMA OF STOMACH: EXCISION BY POLYA-REICHEL METHOD

Dr. Erdmann presented a man who, after nineteen months of persistent gastric symptoms, was subjected to an exploratory laparotomy by Dr. G. D. Stewart at Bellevue Hospital on December 17, 1913. The report states that a mass the size of a hen-egg was found on the posterior surface of the stomach about an inch and a half from the pylorus and adherent to the pancreas. There were adhesions about the pylorus; the gall-bladder was free and compressible; hæmangioma of liver. The wound was closed without further operation. The patient claimed relief for two days after operation, when he became ill as before and continued to go down hill.

On November 23, 1914, he was admitted to Gouverneur Hospital with the diagnosis of carcinoma of the stomach, thought to be inoperable. Test-meal the next morning yielded two ounces of poorly assimilated food; total acidity 40; free hydrochloric acid 25; no lactic acid; no Boas-Opler bacilli; no blood, macroscopically, microscopically, or chemically.

In December the patient began to complain for the first time of constant boring pain in the epigastrium. He vomited after every meal and could retain absolutely no food. He was very anæmic and emaciated, weighed only 118 pounds, and was losing ground rapidly. There was slight tenderness in the epigastrium and upper abdomen, but no tumor was palpable.

January 2, 1915, Dr. Erdmann exposed his stomach by a transverse incision, five inches in length, across the upper abdomen, extending through all the tissues to the abdominal cavity. The stomach was found to be dilated and extensively adherent to the pancreas and liver. The pancreas was freed by sharp and blunt dissection; the liver also was separated, this being very difficult because of the dense adhesions and pathological changes. All the lower part of the stomach was involved in an ulcer which was thought to be malign. The pyloric half of the stomach was excised. A rent was made in the mesocolon and the stomach at the excised region was brought through and anastomosed to the jejunum by a double row of Pagenstecher's sutures, by Polya's method. Three or four sutures were taken in the mesocolon and stomach to close the rent in the mesocolon.

The patient made an uneventful recovery. On February 19 he was helping about the wards. On March 1, he weighed 144 pounds, had had no return of vomiting, and was gaining in weight and color.

Pathological report of specimen removed at operation: *"Chronic gastritis with early carcinoma."*

GASTRECTOMY WITH TRANSVERSE COLECTOMY

DR. ERDMANN presented a man, twenty-seven years of age, who was admitted to the hospital November 4, 1914. Since January, 1914, he had been the subject of the gradual development of the usual symptoms of carcinoma of the stomach.

Examination revealed a hard, movable tumor in the epigastric region, irregular in outline, situated to the left of the median line and extending to the right of the median line. There was no history of syphilis, nor history of intestinal disturbance. The patient was markedly anæmic and showed evidence of considerable loss of flesh; he claimed to have lost fifty pounds in weight.

November 10, 1914, the stomach was exposed and a large mass including its distal half found present. Very few glands were involved. A mass, the size of a large peach, was in the transverse mesocolon. A transverse colectomy and gastrectomy were done, the colon being clamped off at its splenic and hepatic flexures. After bisecting the doudenum, four-fifths of the stomach were removed with the colon, *en masse*. Owing to the small pouch of stomach left, it was necessary to do an anterior gastro-enterostomy. The splenic and hepatic ends of the colon were severed, and a cæcosigmoidoscopy, with appendectomy, was then done.

The patient was up and about in ten days. Has now gained about thirty-six pounds.

ULCER OF DUODENUM, WITH ULCER OF LESSER CURVATURE

DR. ERDMANN presented a woman, thirty-five years of age, who was first seen by him on December 5, 1914. She gave a history of having suffered from gas in the pit of her stomach for several years, with free and considerable belching; had a sense of fulness or discomfort after meals, relieved by taking soda bicarbonate; no vomiting; had had pains in the pit of her stomach, and marked hunger pains for several years; had a desire for food and could eat every ten minutes of the day; no loss of weight; had had some early morning attacks of pain. Examination revealed tenderness on palpation in the right hypochondriac region.

Upon opening the abdomen, February 3, 1915, an indurated ulcer of the duodenum, one finger's breadth, postpyloric, was readily seen. While attempting to deliver the pylorus and first portion of the duodenum, a marked thickening was felt in the posterior wall of the pyloric antrum, near the lesser curvature. The indurated area of the duodenum was excised, and then the pyloric end of the stomach was split longitudinally on the anterior wall, sufficiently to allow inspection of the indurated area on the posterior wall. This was seen to be an eroded ulcer about 1.5 cm. long by about 1 cm. wide. This was excised and the edges were sutured with two rows of catgut. The gap in the duodenum and pyloric end of the stomach was brought together by catgut and linen sutures, transverse to the long axis, so that the final opening was about two inches long. An appendectomy was then done, and the abdomen was closed. The recovery was excellent and rapid.

CARCINOMA OF THE STOMACH WITH LARGE TUMORS

Dr. Franz Torek presented patients and specimens of carcinoma of the stomach in which he had done resection for tumors of considerable size. These cases were selected for demonstration in order to show that the large size of a tumor did not offer a valid reason for refraining from the performance of a radical operation. He said that at the present time surgeons were becoming more and more inclined to approve of this stand-point, but that some ten years ago those who resected in cases of large tumors constituted a small minority. In fact, the most widely spread view was, that when a carcinoma of the stomach was large enough to be felt it had ceased to be operable. He remembered very well how, over ten years ago, one of our well-known consultants commented upon an operation Dr. Torek had performed on one of the cases presented this evening as being a waste of energy and prophesied that within a year he would see the inevitable fatal outcome.

The case in question was the first one presented, a woman, now fifty-nine years old. The tumor, previous to operation, manifested itself by a prominent bulging in the epigastrium of the extremely emaciated patient, that could be plainly seen across the room, moving up and down with respiration. Resection was performed on January 2, 1905. The patient was presented before the Section on Surgery of the New York Academy of Medicine, 14 months later, at which time she had gained 45 pounds in weight. The case was published in the *Medical Record*, June 9, 1906. The pathological diagnosis was carcinoma gelatinosum. The patient subsequently gained still more, but

now her weight is 9 pounds less than her highest figure, owing to the development of diabetes. The speaker called attention to the interesting fact that this specimen, the smallest of the four presented, showed a bulging before operation as prominent and as distinctly visible as the larger ones, and operation had been refused by another surgeon on the basis of its size.

The next case, a male, was operated 3½ years ago. He had almost absolute obstruction. He has gained some 45 pounds since operation. The tumor, the largest of the four presented, an adenocarcinoma, measures 10 cm. in length.

The next one, a male, now nearly seventy years old, was operated 2 years and 2 months ago. The pathological diagnosis was adenocarcinoma. The indurated area measures 7 cm. in length, the whole specimen 11 cm. At one place in the lesser curvature the peritoneal surface is roughened and nodular. The tumor had grown through the entire thickness of the stomach wall. The carcinoma was firmly adherent to the pancreas. This patient has gained in weight more than any one of the others, his weight now being 62 pounds more than before operation.

The last patient, a female, was operated on December 3, 1913. The tumor, a mucinous adenocarcinoma, measures 8 cm. in length. Like the preceding one, this tumor was attached to the pancreas. She has gained 22 pounds since operation. Besides vomiting of food eaten two days before and other symptoms common to most of these cases she had a symptom usually ascribed to duodenal ulcer, a dull pain in the epigastrium, two hours after a meal, relieved by eating; but the pain was also relieved by vomiting. As in all the other cases a large mass was felt in the epigastrium.

Dr. Torek said he did not enter into the details of the histories as he wished to avoid the reiteration of the description of a familiar clinical picture. It was sufficient to state that the patients were all very much run down, markedly anæmic, and in an advanced stage of starvation; that, nevertheless, the patients were able to endure an operation which in every case was a lengthy one. The shortest, the first one, took 1¾ hours, and each of the remaining ones over two hours.

The choice of resection as an operative procedure, the speaker said, depended not upon the size of the tumor but on the question whether the new growth was sufficiently circumscribed to permit the operative interference to reach well beyond the limits of the disease, removing all the affected lymphatic nodes in connection with the tumor.

The absence of metastases was also a condition for the choice of resection. This was the stand-point he had taken ten years ago. The indication for resection had lately been extended by some still further, and, he believed, with justice, so as to include some cases in which it was impossible to remove all the enlarged lymphatic nodes, the reason being that all of these need not necessarily be themselves carcinomatous.

As regards the formerly oft-expressed opinion that a palpable tumor renders the case inoperable, he wanted to say one word. The more benign, slowly growing, well circumscribed tumors at the pylorus are, as a rule, much more easily palpable than the more malignant cases of diffuse infiltration without a definite boundary line. The above mentioned opinion might therefore be reversed so as to read that *a palpable tumor may offer a better risk than many that are not palpable.* Of course, the röntgenogram will give valuable information on this point.

MULTIPLE SYMMETRICAL LIPOMATOSIS

Dr. Frederic Kammerer presented a case of multiple symmetrical lipomatosis in a man of about fifty years. The speaker had seen four other cases during the past 25 years. They were all employees of brewing companies, who drank from 10–30 glasses of beer a day. The case now presented was one of the variety of circumscribed lipomata. Most of these patients seek surgical relief for the growths about the occiput, neck and shoulders. Several had been operated on and little difficulty had been experienced in removing these masses from the back of the neck and head. Only in one case of rather more diffuse development beneath the chin had dissection been rather troublesome.

OSTEOMYELITIS WITH MULTIPLE FOCI

Dr. Clarence A. McWilliams presented a lad of sixteen years, who, three days before his admission to the hospital on April 25, 1912, had complained of pain in the upper part of the left leg, which came on early in the morning, and was made worse by walking. He went to bed that evening with some fever and headache. There was no history of previous injury, and no wound of foot or leg recalled; no tonsillitis, and no suppurative focus elsewhere. The night preceding his admission to the hospital he was delirious. Temperature on admission 105.4; pulse 108; white blood-cells, 24,000; polynuclears, 85 per cent.

There was a fluctuating tender swelling over the tuberosity of the left tibia. An incision of six inches was made through the periosteum

FIG. 1.—May 16, 1912. Osteomyelitis of ulna.

FIG. 2.—June 12, 1912. One month after operation.

FIG. 3.—March 2, 1915. Almost three years after operation.

into the medullary cavity, from the tuberosity downward. Under the periosteum there was a large amount of pus. Four inches of bone were removed, opening the medullary cavity, which was widely filled with pus and necrotic marrow. The wound pas packed. Culture showed staphylococcus pyogenes aureus.

The patient did not improve after this operation. Fluid appeared in the knee-joint, and the leg wound was reeking with pus. Eighteen days later the whole shaft of the tibia was removed, from epiphysis to epiphysis, leaving the periosteum *in situ*. Under the periosteum there was much pus along the shaft. The needle, inserted at the beginning of the operation, obtained turbid yellow fluid from the knee-joint. This showed staphylococcus aureus, the same as in the bone. Autogenous vaccines were made from this pus and administered every other day. After the second operation the patient improved.

Ten days after the second operation, considerable pus was evacuated from over the sacrum. Two weeks after the operation, a large abscess was opened in the left forearm, both containing staphylococci.

The knee-joint was aspirated frequently, but the boy's condition became slowly worse, and he lost ground. Staphylococci were found in both the urine and blood, and urotropin was given.

On April 5, three weeks after the last operation, the knee-joint was drained by two incisions, under gas anæsthesia, and a large amount of very thick pus was evacuated. The patient's condition became progressively worse, and four days later (April 9), to save his life, an amputation was performed through the lower part of the thigh, the sciatic nerve being cocainized before it was divided. The periosteum was separated from the bone before the latter was divided. The soft parts in the stump were œdematous.

Improvement was immediate, and the patient went home on April 25. The sinus on the left forearm was still discharging.

Three weeks later (May 16, 1912), the patient was readmitted, with much increased inflammation and swelling of the left forearm. The X-ray showed that the disease involved two-thirds of the bone of the left ulna. There had been no difficulty in using the arm; no loss in weight, nor fever.

On May 17, 1912, subperiosteal resection of the middle two-thirds of the entire diameter of the ulna was done. Recovery from this was prompt. Readmitted one month later (July 16, 1912), X-rays had indicated a progressive osteomyelitis of femur. This was operated upon. The periosteum was soft, thick and gelatinous. The bone beneath was soft and rough. Bone cortex chiselled away, opening medullary cavity.

Medulla found vascular and necrotic. Several small sequestra removed. While in the hospital X-rays were taken of all the bones. All were negative except the right humerus, which showed a slight periostitis of middle of shaft. The boy has made a perfect recovery. No further bone lesions have developed. The ulna has regenerated a fair shaft but weak, an ununited fracture in its lower part. Pronation and supination are almost perfect. That forearm is slightly weaker than the opposite one.

RESECTION OF THE STOMACH FOR CARCINOMA

DR. JOHN DOUGLAS presented a woman, fifty-two years of age, who came under observation on April 11, 1912. She complained of having had stomach symptoms for the previous two years.

Physical examination revealed a mass seven or eight inches in diameter, in region of umbilicus, which moved up and down on respiration. Gastric analysis shows no free hydrochloric acid, no lactic acid, no blood. X-ray examination showed carcinoma of pylorus.

Operation (April 19, 1912): Between one-third and one-half of the stomach was removed by the Billroth No. 2 method.

Pathological Report.—Scirrhus carcinoma of the stomach; enlarged lymph-nodes not involved.

The convalescence was normal.

At the time of presentation, within one month of three years since operation, the patient is in good health, and is up to her normal weight. Dr. Douglas called special attention to the absence of any evidence of recurrence for almost three years after resection, notwithstanding the long history of the presence of a mass before operation.

MELANOSARCOMA OF SHOULDER AND NODES ABOUT SHOULDER: WELL AFTER INCOMPLETE OPERATION

DR. FRANK S. MATHEWS presented a man, forty-five years of age, who when first seen presented a pigmented mole over the middle of the scapula. This, the patient said, had always been present, but had recently increased in size and had been uncomfortable when he leaned back, putting pressure on it. There was noted a fulness above the corresponding clavicle and a large mass of axillary nodes. The mass was about the size of a small fist, was freely movable, and some of the nodes were at least as large as hickory nuts. Because of the well-known malignancy of melanosarcoma and that metastases had already taken place, Dr. Mathews considered the case a hopeless one. Nevertheless, he removed the mole, and through an axillary incision about three

FIG. 4.—Photomicrograph of tumor.

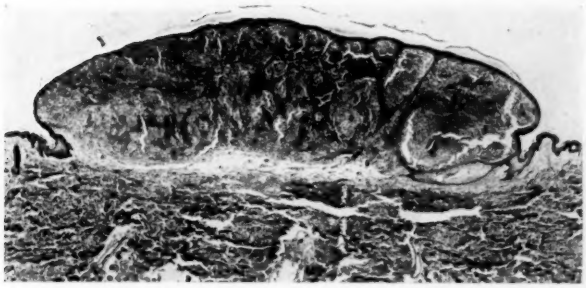

FIG. 5.—Gross appearance of melanosarcoma.

inches in length grasped the main mass of nodes and removed them. No operation was done on the supraclavicular swelling, and the operation on the axillary region was not in any sense a complete dissection of the axilla.

The skin tumor was distinctly pigmented, but the axillary nodes were macroscopically free from pigment. The pathologists who saw the section at the time called the case one of melanosarcoma, and it presented the clinical characters of that tumor.

Immediate return was confidently expected, with death in a few months, especially as the progress had been rapid; the growth of the axillary nodes (to fist-size) had been noted but five weeks.

The patient now, two years after the operation, appears to be well. There is no fulness above the clavicle, no recurrence at the site of the mole, no abnormal physical signs in the chest. There is a node the size of a hazel-nut to be felt in the axilla. The man has been at work as an engineer ever since the operation.

Dr. Mathews said he had heard of melanosarcomas of the eye which have not recurred in the liver until several years after removal of the eye, but in the present case dissemination had already occurred at the time of operation, and the microscopic examination left no doubt of the character of the primary and secondary growths.

Report of Dr. Francis Carter Wood on the Specimen.—Path. No. 8313. The primary tumor consists of a small pigmented mole, measuring only about 2 mm. in thickness and 5 mm. in length. The deeper tissues are not invaded by the growth.

The mole itself shows evidence of malignant change. It is composed of masses of large cells cut off by irregular trabeculæ of epithelium. Between these cells there is an abundance of lymphoid tissue. There is a moderate number of pigment-bearing cells scattered throughout the tumor. The tumor cells themselves contain numerous mitoses and are large and irregular, with nuclei containing an excessive amount of chromatin. Diagnosis is melano-epithelioma.

The axillary tumor corresponds in its morphology with the pigmented mole. It is composed chiefly of spindle and oval cells with large hyperchromatic nuclei, many of which contain mitotic figures. The tumor is well vascularized and almost no pigment is present. The tumor cells are diffusely invading the surrounding connective tissue and the growth has every appearance of an extremely malignant neoplasm of the type commonly seen originating in congenital moles. The number of mitoses may be estimated from the fact that in one field of a high objective three or four division figures are often found.

It was not suggested that the case was cured permanently nor was there any explanation offered of the prolonged immunity from recurrence.

Dr. Alexis V. Moschcowitz said that such cases are likely to

surprise one at almost any time. He recalled a case in his service where a young woman was admitted to the hospital for a pigmented tumor which she had had for a number of years, just above the mons veneris. The tumor could not have been larger than the end of the finger, and though it had existed for years without giving trouble, just before admission to the hospital it became ulcerated. It was excised widely, and after the usual laboratory argument as to whether it was melanocarcinoma or sarcoma, it was decided in favor of the former. There were no palpable glands in either groin.

Later, she returned to the hospital, and at that time there was noted in the right femoral region a very hard tumor the size of an egg, and two small tumors at the inner side of the femoral region extending beneath Poupart's ligament. These tumors were extirpated and found to be melanocarcinoma. They were thoroughly pigmented. The prognosis is exceedingly precarious.

Dr. Eugene H. Pool referred to recurrence after melanosarcoma of the eye which Dr. Mathews mentioned in the report of his case, and cited an experience of his own about seven years ago. A woman was admitted to the French Hospital for a tumor in the breast; she gave a history of having had an eye removed five years previously. There seemed, however, to be no connection between the eye and the breast; the tumor of the breast presented the physical signs of carcinoma. Accordingly, a complete operation was performed. Transection showed a tumor extremely black in color which proved on microscopic examination to be melanosarcoma. He then looked up the literature of the subject, and found that in a large proportion of the cases of melanosarcoma originating in the uveal tract metastatic growths are of late occurrence, often from five to seven years after the enucleation of the eye for the original growth; also that when metastases become evident their growth is usually extremely rapid. These two features were illustrated in his case. The growth in the breast had appeared only a few months before the breast operation which was five years after the enucleation of the eye. In spite of a radical operation general metastases developed and the patient died in six months.

Dr. Frederic Kammerer recalled a case of melanotic tumor of the labium majus, which he had removed many years ago, where no enlarged glands were present in the groin. He had followed the case for a year and a half after operation, with no recurrence. Of another case, which occurred in a young physician, Dr. Kammerer said he did not remember where the primary tumor was located, however, a short time after extirpation metastatic deposits appeared in the lymph-nodes

and the skin of the entire body. He then removed a large mass of glands in one axilla for the relief of severe pressure-pains. These glands were very much pigmented like the original tumor. The patient died a few months later. The speaker said that in the cases he had seen the metastases in the lymph-nodes were always pigmented and then the case had followed a rapid fatal course.

CARCINOMA OF THE STOMACH

Dr. George Woolsey read a paper with the above title, for which see page 22.

Dr. John F. Erdmann said that there were several points in Dr. Woolsey's paper to be considered—one of them being the question of posterior gastro-enterostomy. In these conditions of the stomach he had always felt that, if one could do a posterior gastro-enterostomy, a gastrectomy is also possible (provided the patient's general condition will allow), on the grounds that the stomach must be rotated and brought through the transverse mesocolon, hence the stomach is then sufficiently movable to allow of resection.

In regard to age: Dr. Woolsey's cases all occurred in patients over thirty. Dr. Erdmann said that out of 43 resections he had had four that were under that age—one 27, two 28, and one 29 years of age.

In regard to metastases: The boy who had been presented had metastases—a metastasis the size of a small peach was in the transverse mesocolon. The stomach was quite movable, and the tumor was movable. It seemed policy to remove it even with the metastases, and in the face of the high mortality in resections of the transverse colon when associated with resection of the stomach.

Dr. Erdmann then told of a patient who presented himself last summer, with a distinct history of carcinoma and also some evidence of ascites. The family requested that something should be done. It was a typical case in which to do a resection, except for general peritoneal carcinosis—one metastasis, the size of a large pea, being in the meso-appendix. The stomach was removed in face of multiple metastases in the peritoneal cavity. The man is living to-day and in fine condition—having gained forty pounds. He hoped to have one of those spontaneous recoveries, as seen in the papillo-cystomata of the ovary.

Dr. John Douglas inquired concerning the ultimate result in the 13 cases Dr. Woolsey had operated on. The statistics obtained from different authorities differ greatly. All are familiar with the statistics from the Mayo clinic, of 33 per cent. without recurrence at three years and 25 per cent. at the end of five years. Friedenwald writes of 1000

cases of gastric carcinoma, only 28 per cent. of which were operated upon. Of these 57 per cent. were exploratory; and only 3 per cent., or nine cases, had a partial gastrectomy, none of which was still alive at the time the report was made.

Dr. Douglas said that he had 8 cases of resection for carcinoma of the stomach; of these, one was still alive two years and eleven months after operation, the longest; another, two years and six months; and a third, two years and three months after operation. The last patient was thirty years of age, with a carcinomatous degeneration of a gastric ulcer.

Dr. Moschcowitz thought that Dr. Woolsey was properly conservative in stating that he hoped for earlier diagnosis of carcinoma of the stomach with the aid of the X-ray, and said that he shared the doctor's views, but his own experience up to the present time led him to regard X-ray evidence as merely confirmatory. At present he relies mainly on examinations of the stomach, and is in the habit of dividing the work into four groups: First, and of great importance, the history of the patient; second, the physical examination; third, the so-called laboratory examinations—test-meals, the presence or absence of hydrochloric acid and lactic acid, etc.; fourth, and last, only the X-ray examination. Of course the X-ray is an exceedingly valuable aid, but only confirmatory, and in most instances the diagnosis can easily be established by the first three methods of examination. He could not recall any case in his experience where he had depended on the X-ray diagnosis and had operated on that authority only and not by the other findings.

His longest case of resection of the stomach was that of a woman reported some five or six years ago, who had two-thirds of the stomach resected for sarcoma. The patient is perfectly well to-day.

It is greatly to be regretted that so much of the material that we work upon has to be treated by exploratory laparotomy and gastroenterostomy on account of stenosis. Most of the material that comes to Mount Sinai and the other hospitals is very poor, and probably not more than 10 per cent. of all the cases of carcinoma of the stomach that come to operation are in an operable condition, not to speak of curing them. He had that afternoon operated on a young man of thirty-six with a palpable tumor. The diagnosis was made, and exploratory laparotomy revealed a tumor of the pylorus, a carcinoma, and a separate and distinct tumor in the pancreas.

Dr. Moschcowitz said that he believed only those cases are curable in which all of the diseased tissue can be removed in one mass.

DR. KAMMERER said that doubtless all would agree with what Dr. Moschcowitz had said about the character of these cases in hospital practice. As the longest period after resection of the stomach for cancer, during which he had been able to observe a patient and note freedom from recurrence, he mentioned five years. This was in a man of about fifty years. The tumor was one of the largest he had ever operated on, two-thirds of the stomach being removed. When last seen, there was no sign of a recurrence. All the other cases which he had been able to follow had died, excepting those operated on during the past two or three years. No doubt these poor results were, as had been said, due to the fact that most cases of cancer of the stomach still reach the hospital surgeon when the disease was very far advanced. He had operated on four patients under thirty years of age, all of whom had died soon after operation, and he wanted to emphasize the great malignancy of these cases in early life. He had operated successfully on cases with a percentage of hæmoglobin as low as 25 and had never been compelled to resort to transfusion. It is astonishing how well these operations are borne even with such an extremely low hæmoglobin count.

Dr. Kammerer said that he did not believe that the X-rays could always determine the operability of these tumors. A few weeks ago he had been able to remove a large cancer of the stomach in a case in which the X-rays had given the impression of an inoperable tumor.

Dr. Kammerer believed that gastro-enterostomy is indicated where a stenosis at the pylorus has developed and there are reasons for not doing a resection. Such patients can live for years, as we all had experienced. But no doubt everybody would agree with the reader of the paper that resection should be done in preference to simple gastro-enterostomy, whenever the same was technically possible, even in the presence of lymph-nodes which could not be removed. The speaker had always done posterior gastro-enterostomy. If this was impossible, owing to adhesions or involvement of the posterior wall of the stomach, the anterior, long-loop operation had given him excellent results. This should, however, always be combined with an entero-enterostomy in the speaker's opinion.

DR. TOREK said that to the number of cases in which a gastro-enterostomy is indicated we should not forget to add those in which there are metastases in the liver or elsewhere in addition to the obstructing tumor of the pylorus. Some of these do very well for a long time. He had operated on a patient six months ago with a large

metastasis, doing a gastro-enterostomy, and the patient is still very happy and grateful.

In respect to carcinoma of the cardia, Dr. Woolsey had stated that we have as yet no method of operating. Völcker had operated on carcinoma of the cardia in 1907, and Kümmel in 1909, and both operated by the abdominal route. The former sutured the œsophagus to the stomach after resection of the tumor, and the latter made a partial suture over the two arms of a T-tube, the leg of which was brought out through the abdominal wound for feeding purposes. Zaaijer, in 1913, operated by a combined abdomino-thoracic method in three stages, the first being a gastrostomy; the second stage was the resection of the lowest 7 ribs on the left side in order to cause a collapse of the chest; the third stage was the excision by the combined abdomino-thoracic operation, the incision being made through the abdomen, thorax, and diaphragm.

Dr. Torek said that his own method, which he had worked out two years ago on the cadaver, and which is published in Johnson's *Operative Therapeusis,* was also a three-stage method: first a gastrostomy; second, the removal of the œsophagus from the thorax by his own method and its subcutaneous inplantation, and the invagination of the lower stump of the œsophagus into the stomach; third, the resection of the stomach by the abdominal route. He had not had a suitable case on which to test the method. Ach's method of resecting the cardia is as follows: The œsophagus, after ligation and division above the tumor through the abdominal route, is removed, without opening the thorax, by invaginating it. The lower end is tied to a flexible steel rod introduced through the mouth, and with its aid the œsophagus is drawn up into itself. Through an incision previously made in the neck it is again evaginated. Ach operated on a patient in this way and kept him alive for sixteen days.

TRANSACTIONS
OF THE
PHILADELPHIA ACADEMY OF SURGERY

Stated Meeting, held March 1, 1915

The President, Dr. John H. Gibbon, in the Chair

SPLENECTOMY FOR GUNSHOT WOUND

Dr. Thomas F. Mullen (by invitation) presented a colored man, twenty-eight years of age, who was brought to the Pennsylvania Hospital at midnight of January 6, 1915, one-half hour after having received a shot wound from a thirty-eight calibre revolver, in the hands of a man standing a few feet distant. The point of entrance was in the left mid-axillary line on a level with the tenth rib, which was comminuted. The patient was in profound shock, temperature 96°, pulse 160, respiration 48; the abdomen was diffusely tender and rigidity was marked, especially on the left side. On percussion, there was shifting dulness in both flanks. The abdomen was opened, beginning twenty minutes after admission; incision was made at the margin of the left rectus, and later enlarged by dividing the muscles transversely to the left, for a distance of three inches. Upon opening the peritoneum, there was a gush of dark fluid blood which, after packing off the intestine, was seen to be flowing from the region of the spleen. The spleen was grasped and lifted into the wound. It was found that the bullet had passed through the upper pole of the spleen, downward and backward, severing the vessels of the pedicle, which was clamped and ligated *en masse,* with catgut. Gauze drainage was instituted and the wound was hurriedly closed, as there was no apparent injury to any other structure. At the close of the operation, the pulse was imperceptible and twenty ounces of normal salt solution were given intravenously. The patient reacted quietly and vomited once during the following day. The drains were removed on the fourth day and the wound appeared to be clean. From this point his convalescence was uneventful, with the exception of a severe chill which occurred on the twenty-sixth day after operation, and was repeated on the twenty-eighth and thirtieth days. An examination of the blood at this time revealed, in fresh and stained specimens, many malarial organisms of the tertian type, and the symptoms promptly disappeared after the

use of quinine. On the third day after operation, examination of the blood showed 48 per cent. hæmoglobin, 2,430,000 erythrocytes, 15,000 leucocytes; on the eighth day, 50 per cent. hæmoglobin, 3,160,000 erythrocytes, 20,000 leucocytes; on the sixteenth day, 50 per cent. hæmoglobin, 3,230,000 erythrocytes, 22,000 leucocytes; on the twenty-fifth day, 53 per cent. hæmoglobin, 3,928,000 erythrocytes, 15,000 leucocytes; on the thirty-fifth day, 70 per cent. hæmoglobin, 4,000,000 erythrocytes, 15,200 leucocytes. The erythrocytes were normal in size and shape. Skiagraph showed the bullet lodged just anterior to the transverse process of the first lumbar vertebra on the left. Patient was discharged on the thirty-fifth day after operation as cured. Since his discharge he has been working at his usual occupation and appears to be perfectly normal.

RUPTURE OF THE BICEPS MUSCLE

Dr. Gwilym G. Davis presented a man who ruptured the long head of his left biceps muscle, approximately seven weeks ago, in lifting a bag of coffee weighing 130 pounds. The man says he had pain in the shoulder before he injured it, although there is no other distinct history of rheumatism. He had the typical swelling below. An incision was made along the edge of the pectoralis major; the long head, which was ruptured clear up into the joint, was pulled down, and brought over to the short head of the biceps muscle, which is attached to the coracoid process. Chromic catgut was used for the suture. The wound healed nicely. He now flexes and extends his arm perfectly. The operation presents no especial difficulty, except that it is rather hard to draw back the pectoralis major muscle sufficiently to get a good exposure. This was the second case in which Dr. Davis had operated.

Dr. John H. Jopson said that he had recently seen a case of this injury with a most unusual history. The man was a railroad engineer who in July, 1913, slipped in getting out of a boat and fell a short distance, striking his shoulder against the edge of a railroad tie. The injury was followed by some ecchymosis but there was no marked trouble with the arm for some time. It was not until months later that he suffered much pain, and when he did go to a hospital, more than a year after the injury, he was told that he had a rupture of the biceps muscle. Meanwhile he had been working steadily at his occupation as an engineer. He was operated upon by Dr. Gibbon but he still presents some of the characteristics of rupture of the biceps, in the way of bunching up of the belly of that muscle and on flexion of the forearm, and he complains of pain and disability in his arm with

tenderness, just below the acromion process, between it and the head of the humerus.

Dr. John H. Gibbon said that he recalled very well the case referred to by Dr. Jopson and particularly the history of the man. It illustrated the point remarked upon by Dr. Alexander in the paper which he read before the Academy, that the history of not knowing that the rupture had occurred was not an unusual one. Some of the men in Dr. Alexander's series apparently did not know that they had ruptured their biceps and had gone ahead with their work, and the correct diagnosis was not made for some months afterward. In the case which he operated upon he sutured the ruptured tendon to the other tendon. The man had excessive blistering from iodine on the inner side of his arm, and from these infected blisters the wound became infected, so that they did not get a very good result. Some time after healing of the wound he developed much pain in the region of the deltoid. He had been at a loss to understand why he should have had it. It was thought that possibly a nerve was involved but there was no atrophy of the deltoid. The man was asked particularly whether he had this pain in the shoulder before his operation and he stated distinctly that he had not.

BONE GRAFT PEG IN THE TREATMENT OF FRACTURES

Dr. Fred H. Albee (by invitation) read a paper with the above title, for which see page 85.

Dr. John H. Jopson said a word in defence of silver wire in certain locations. He had used it in fractures of the patella and of the olecranon for years, and had never had occasion to take it out of either of these locations, and had never seen it give any trouble. He had never seen it break unless there had been a re-fracture of the part. It may be, as has been long taught, that the chemical action about silver in the tissues is different from that of other metals. When silver plates have been used and required removal subsequently, it is often found that it was the plated or steel screws rather than the silver plate itself that caused the trouble. In the case of one young woman upon whom he had operated for ununited fracture of the tibia and from whom he had to remove the plate years afterward, it was found that the abscess had originated around the screws, which were rusted. The silver plate had caused no irritation. It was firmly embedded in the tibia, which had to be chiselled away before it could be taken out, after removal of the screws.

Dr. William L. Rodman said that he had had very excellent

results with silver wire in fracture of the patella and elsewhere. One case operated upon fifteen years ago is still in good condition. He had also had good results in the use of plates, particularly the plate of Dr. Estes, of Bethlehem. But he believed that plates of all descriptions were for the exceptional, not the average, case and that the very frequent use of plates now in vogue was hardly necessary. In many cases the plates do harm.

Dr. Charles F. Nassau said that he had used silver wire in fractured patellas for many years without being obliged to remove it because of any trouble for which it was responsible. He believed that silver wire in the tissues is harmless. It may be recalled that for a time abdominal incisions were closed with silver wire; in fact, during the first seven years of his operative work in Philadelphia, he closed every abdominal incision with silver wire—even after operations on such cases as pus-tubes—and was obliged in two cases only to remove the wire. This is not a large percentage in seven years. In one of these cases, three of the six sutures were removed, and in the other case, all the sutures had to be removed because the resident had introduced a probe into the wound within 48 hours after operation. He did not recall, at this moment, ever having removed a silver wire after operation upon a simple fracture. In compound fractures, of course, subsequent removal of the wire is frequently necessary.

Dr. Penn G. Skillern, Jr., recalled the classic comparison between bone and the soft tissues. Bone, after all, is nothing but soft tissue plus earthy salts, and one should deal with it as such. One would not deliberately put metal into soft tissue; rather, remove it when accidentally introduced: why, then, should surgeons put metal into bone? Bone, being living tissue, tries to throw the metal off as a foreign body. One sees this in the plating of fractures. With the plate *in situ* at operation, the fragments are firmly held together, but later, before callus formation has progressed very far, osteoporosis around the screws causes them to loosen, with consequent shifting of the plate. Those plates that remain *in situ* for several years are merely exceptions to the rule. It is most illogical to put metal into bone, and he foresaw that Dr. Albee's bonegraft inlay and peg methods had sounded the knell of all metal fixtures.

Continuing the comparison between bone and soft tissues, take, for example, a nerve that has been divided for some time. There are bulbs of scar-tissue at the ends. The ends are perfectly contacted, but one never gets union. Why? Because the nerve-fibres cannot penetrate the barrier of scar-tissue. When, on the other hand, the bulbous

scarred ends are removed until the brush-like ends of the fibrillæ stand out, and the freshened ends are *accurately* contacted, regeneration occurs, and the nerve resumes its property of conduction. The same state of affairs is met with in an old, ununited fracture. The ends of the fragments are sclerosed (scar-tissue), and with the plate we get contact without union, for the same reason, unless the ends be resected. By the bonegraft inlay method of Albee, on the other hand, healthy bone spans the sclerosed area, and assures union by its osteogenetic, as well as osteoconductive, properties.

Dr. Albee, in closing, said that he had seen silver wire break in several instances in fracture of the patella, in one case coming through the skin. Silver wire in ununited fractures is most untrustworthy. Fixation is a secondary consideration. Something is required to span the sclerosed bone and complete the contact with healthy bone beyond the point of fracture, something that will not only supply bone callus but that will stimulate osteogenesis, and this the bone graft does. He was equally certain that in relatively large grafts a varying part of the central portion acts as a scaffold for migrating bone-cells from the fragments. The reconstruction of the graft is a physiological affair. Regarding extrusion of the graft, there was one case where the graft was applied to the jaw, and the wound connected with the oral cavity, in which practically all the graft came out. In only two in 400 cases has the whole graft been extruded. He had had in several cases little slivers come out. The whole graft has been laid bare by an infected wound and has become covered up with granulations; perhaps little shells have come off, but the graft has served its purpose. It is a most trustworthy surgical agent and of an entirely different class from metal. It has a definite resistance to infection. He had had no experience in the use of the graft in jaw fractures. Some of his cases of fracture of the neck of the femur had been of long duration (*i.e.*, up to two and one-half years).

EDITORIAL

THE CAMPAIGN AGAINST CANCER

THERE is no surgeon to whom the problems of cancer, whether carcinoma or sarcoma, are not of the most engrossing interest. The intensity with which research laboratories, especially maintained and equipped for cancer study, are working to discover the primary cause of the irregular, unchecked proliferation of cells which constitutes cancer, is matched by the eagerness with which surgeons everywhere are endeavoring clinically to check, head off, or eradicate the disease when once started. But every trail which has seemed to promise to lead to a knowledge of the cause of cancer has thus far ended blindly, and in the great majority of instances, the most intelligent and radical clinical effort to overcome this disease when once developed has had but one end—the tragedy of death.

Two points of light, however, appear in this vast cloud of discouragement and disappointment. Research and experience together, as they accumulate, make more and more certain, first, that the condition is primarily a local one; and, second, that up to a certain point in its early history it is susceptible to absolute and definite removal with no danger of return other than the possibility of new development incident to any living tissue.

The full realization of what these two things mean is of vast importance. The belief, widespread in the previous generation, that cancer is from the first a constitutional disease still exerts its baleful influence at the present time, so that many educated physicians are even to-day skeptical as to the possibilties of radical relief from any operative interference. The natural reasoning with such advisors is that when tumors are detected which may possibly be cancerous, it is already too late to interfere with any hope of permanent relief, hence the propriety and desirability of using temporizing measures with the hope that the later history of the case may demonstrate that the first suspicions as to its character were unfounded. The inevitable result of such measures is the postponement of interference until in truth the case has advanced beyond a point where any likelihood of entire eradication of the disease by any local attack has passed.

Unfortunately, this state of mind among practitioners has some

basis in the not infrequently observed fact that indurations, ulcerations, and tumors, which are apparently of a suspicious nature, do sometimes disappear or are recovered from with the lapse of time and the use of simple resolvent remedies. One such case will make a much deeper impression upon the mind of the average observer than the many more cases in which a tumor is found after such watchful waiting to develop unmistakably malignant conditions, and that when once its nature is fully appreciated the opportunity for its radical removal with permanent relief has passed.

Although the natural reluctance of any individual to perform or to undergo an unnecessary operation, especially if it is of a mutilating character, must enter very largely into the problem of the surgical treatment of tumors, on the other hand, even more importance should be given to the much greater and more tragic disaster of postponing radical attack upon a tumor until the possibilities of benefit from such an attack have vanished. There is very much to justify the position of a surgeon who is guided by the principle that it is better to be unnecessarily radical or early in his dealing with many benign growths, than that he should fail to be early enough or radical enough in his dealing with one malignant growth.

Entering into this problem also is the fact that a very considerable proportion of growths, benign in their early history, in their later course develop malignant characteristics. The surgeon who, after the removal of a growth finds that the growth is not malignant, must have a condition of mind far more to be desired than that of the surgeon who, after postponing for a long period any dealing with a growth, finally subjects it to operation, finds that it is of malignant character and that during this period of waiting a diffusion beyond the possibility of entire eradication has taken place.

There is much to justify, therefore, the present day tendency to consider all tumors suspicious and as calling for prompt eradication, provided such eradication does not involve immediate danger to life. If such a state of mind could be created throughout the community as a whole, as well as among advanced surgeons, it would clear the field at once of much of the cause for the agitation on the subject of cancer which is occupying the mind of the medical world at the present time.

The importance of early and sufficiently radical removal of suspicious growths constitutes the crux of the whole cancer discussion of the present day. The knife, the cautery, the caustic, the radium and the X-ray are all important, and each one has its place, but each one is secondary to the great principle of early and radical destruction of the

diseased tissue. Each agent will leave its best and most lasting results when it is applied at the beginning of the tissue changes which this controls.

We have very great sympathy with the crusade which has been organized and is being effectively carried on for disseminating a knowledge of the natural history of cancer and the possibilities of its operative relief which modern surgery presents.

The immediate cause which has prompted these remarks is the effort of the Medical Society of the State of Pennsylvania, through its Commission on Cancer, to organize and stimulate a widespread movement among the medical journals of this country to call attention to the facts with regard to cancer as we know them to-day. While it is true that the surgeons who form the clientele of the ANNALS OF SURGERY are hardly likely to need any such awakening or stimulation, certainly not any enlightenment, nevertheless, the full sympathy which the ANNALS OF SURGERY has with this movement is such as to cause us to write these paragraphs to express our fullest sympathy with the efforts of our Pennsylvania colleagues.

LEWIS S. PILCHER.

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Remittances for Subscriptions and Advertising and all business communications should be addressed to the

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